RAILROAD GAZETTE

FRIDAY, AUGUST 28, 1903.

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Contributions

The Eyebars in the Wabash Bridge.

Narberth, Pa., Aug. 20, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the article on the Wabash bridge at Pittsburg which appeared in your issue of Aug. 14, it was stated that the 14 in. x 2 in. eyebars manufactured at the Ambridge plant of the American Bridge Co. were the largest ever made in the world. This is not true, as the Phoenix Bridge Co.'s plant at Phoenixville, Pa. (not N. J.), has repeatedly and without any difficulty turned out 15 in. bars. These bars gave very satisfactory tests on their testing machine, whose capacity is 2,250,000 lbs. direct pull or push. It is, therefore, not quite correctly stated that the testing of the 14 in. x 2 in. bars would seriously tax the Phoenixville testing machine. Taking the ultimate strength of the steel used at 70,000 lbs., there would be required 14 x 2 x 70,000 = 1,960,000 lbs. pull to break one of those bars, which still leaves a handsome margin in favor of the machine. The Ambridge plant will therefore have to make another effort before it can claim the championship of the world.

HENRY SZLAPKA, *Consulting Engineer.*

[The statement that the 14 in. x 2 in. eyebars were the "strongest" ever forged (not the "largest") was made after computing the probable strength from the tests quoted of 14 in. x 1 9/16 in. eyebars of the same material and comparing it with the actual breaking load of a 15 in. x 2 in. eyebar which, so far as we can learn, was an experimental forging and never used in any structure. If we are correctly informed, the 15 in. bar was upset and hammered out to form the head. The 14 in. x 2 in. bars made at Ambridge have the heads formed in the upsetting machine, which corresponds to the best practice on smaller sizes.—Editor.]

Training Trainmen to Do Careful Work.

Philadelphia, July 30, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have read your article [July 24] wherein you tell of trainmasters who use a buzzer to teach enginemen how to make whistle signals properly. Some enginemen seem determined not to learn how to make either the length or proportion of the blasts, or the intervals between blasts, or the total length of the group of blasts as they should be made according to the plain instructions laid down in the signal code. It is true that a man who is inexact in one kind of work may be expected to be subject to the same weakness in other kinds. But while we are considering the question of a lack of finely trained nerves we should consider conductors and brakemen, firemen and signalmen; for these men also have to do things requiring precision of thought and motion. Conductors need object lessons in making the go-ahead hand—or lantern—motion as much as enginemen need them in the matter of the whistle. Why has the American Railway Association laid down rules for these signals? If not to be obeyed why not do away with them? You will see go-ahead motions made in half a dozen different ways, and the stop motion made in a manner that makes it indistinguishable 500 ft. away. Why do we not engage Dr. Scripture, of Yale University, to measure the dullness of these inefficient brains? By so doing we should greatly facilitate the work of educating the men up to the proper standard. In his letter to the *Railroad Gazette* of Jan. 31, 1902, he said that he had the means of doing the trick. I do not mean by this to say that the trainmasters of the country cannot suitably educate their men without the assistance of a college professor; yet all will agree that the professor, if he is a modest and sensible person, and one who is pleasant to get along with, is pretty sure to be a decided help, even though he be a psychologist—or a misogynist, for that matter.

Not long ago an item was published saying that on the Hocking Valley road the freight brakemen used a metal disk with which to give hand signals. This expedient had been adopted, as I understand it, for use with very long trains; where an ordinary hand-motion is not quickly distinguishable. Now, my plea is for similar help on shorter trains. The need is not so great as on a long train, but still it is a need. If we are going to adopt military methods to the extent of requiring neat and handsome uniforms and a general high standard of personal behavior and appearance, why should we not go further and conform to military standards of precision and correctness in the work that is done? The suggestion that a white handkerchief be used with which to make hand-motions is a good one; and the handkerchief is superior to the metal disk in that it can be carried in the pocket, can be renewed or made clean as often as desirable, and can easily be made to reflect the light; that is, can be made visible more easily than can be done with the metal disk.

Since reading the letter in your issue of the 24th I have taken more than usual notice of the whistling, on half a dozen different roads; and it is remarkable how many men seem to find it easy to make almost anything except the right combination. Four blasts of approximately equal length is one of the most commonly heard crossing signals. The slovenly whistler seems more inclined to lengthen the third or fourth blast than the first and second. Another common signal is that in which the first three sounds are made according to the rule, while the fourth is prolonged simply to show that the man at the rope has notions of his own, and is not bound by the inflexible precepts of the rule book.

Pray, Mr. Editor, let us have a little accuracy and neatness in the railroad service outside of officers' cars and Pullman sleepers.

A. M. G.

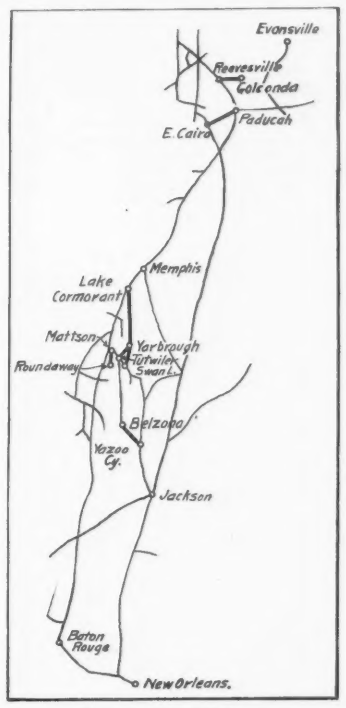
Joint Use of Passenger Stations in England.

Running powers and rights to use a station in common if given by Parliament and never repealed must be respected even to the dispossession of the trains of the actual owners of station, and although the powers may have not been exercised for years past. This is the outcome of the litigation which has recently taken place between the Great Central Railway Company on the one hand and the Great Northern and the Lacashire & Yorkshire on the other, the two latter companies being joint owners of the Leeds Station, and the Great Central having the right to use that station in common with them. These powers were granted to the old "Sheffield" Company, the predecessor of the Great Central, as long ago as 1866, the quid pro quo being extensive rights accorded in the same Act to the Great Northern over "Sheffield" territory in Grimsby. At that time, of course, there was no question of competition between the two companies, and certain of the Great Northern rights in Grimsby were never used or attempted to be used until after the Great Central line to London was opened; while the Sheffield's rights for passenger trains into Leeds were first exercised in 1879; but the trains were taken off in 1893 owing to the depression caused by the coal strike and were only resumed in May last, when three in each direction were put on by arrangement with the Great Northern and the Lancashire & Yorkshire Companies.

These six trains seemed, however, to the Great Central authorities to be a very small number compared with the 169 trains run by the Great Northern and the 71 by the Lancashire & Yorkshire, and so they proposed on May 17 to put on four more each way, to be started on July 1. The result was an application by the owning companies for an injunction to restrain these trains being run into Leeds Station, the contention being not against the Great Central's right of user, but that such user as a matter of law could not take place until the times, etc., of the trains had either been "agreed" or settled by arbitration. The legal objection was not sustained by the Judge and the injunction was refused, and after the matter had been to the Court of Appeal, it was referred to the Railway and Canal Commission to settle the terms and conditions of user. In view of the diversity of the evidence given before the Commissioners on both sides as to the practicability or otherwise of admitting the new trains the Commissioners' decision at any rate does full justice to the owning companies. For a company having rights of "common user" of a station to ask to run 14 trains a day only while the others ran 169 and 71 respectively seemed to the Court at least reasonable and they made an order accordingly; but in order to minimize any possible inconvenience to the owning companies and the public by existing trains having to be taken off the order is not to come into force until October 1. Meanwhile Great Central passengers by the "additional" trains will have to change at Wakefield. One of the chief points of interest in this decision is that the rights of the public to the fullest possible accommodation, irrespective of which company provides it, will be paramount.—*Transport.*

The Illinois Central Improvements.—New Lines and Second Track.

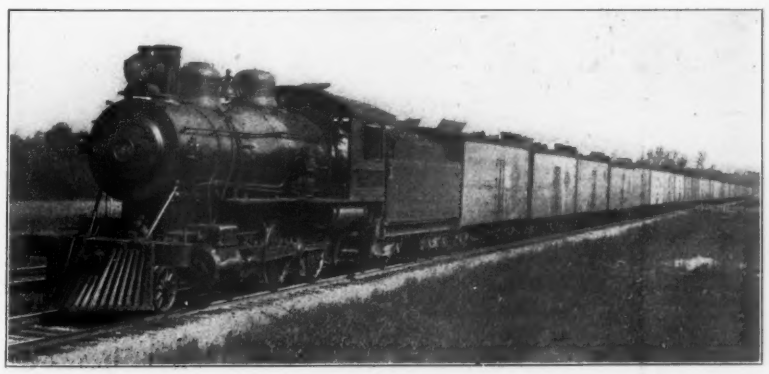
An account of the grade reduction work now being done by the Illinois Central for the purpose of bringing all portions of the north and south route into shape for handling heavy train loads, was printed in the *Railroad Gazette* Aug. 14. In connection with grade reduction, several entirely new lines have been built, among which may be mentioned the one from Paducah, Ky., to East Cairo, Ill., 33 miles long, affording a route much better



New Lines Building.

than the present one, for business between St. Louis and points east of Paducah, including the Louisville Division. Traffic from St. Louis to points on the Louisville Division now goes by way of Carbondale and Brookport, and encounters a ruling grade of 100 ft. per mile, occurring where the line crosses the extension of the Ozark Range, near Parker, Ill. A further objection to the present route is the ferry transfer between Brookport, Ill., and Paducah, Ky., crossing the Ohio River near its mouth. The distance traversed by the ferry is three miles and a half, and the crossing, which consumes about 40 minutes, is a source of delay and a decided inconvenience with heavy traffic.

The new line is designed to overcome these difficulties and to develop the territory between the two points. It is some distance back from the Ohio River, and occupies high ground for nearly its entire distance, with a 40 ft. ruling grade and maximum curvature of 3 deg. The line is now ready for use, and is so located that traffic on it to and from St. Louis can be handled over the new low-grade line from Groves to Mounds, Ill., which was mentioned in the previous article. The latter, it will be remembered, involves about 30 miles of new track, and trackage rights for eight miles on the Chicago & Eastern Illinois, between Thebes and Olive Branch. The ruling grade on this new Groves-Mounds route is only 26 ft. per mile, with compensated curves. The sketch map of new



Banana Express on the Illinois Central; 34 Cars; 433 Tons of Fruit, Net.

lines building, printed with the present article, will serve to locate these points, Groves being just south of the junction at Pinckneyville; Thebes, on the Mississippi River, and Mounds, on the main line south.

A new branch known as the Golconda Line was put in operation last December, from Reevesville, on the old Carbondale-Paducah route, to Golconda, on the Ohio River, 16 miles east. The line was built for purely commercial purposes, as distinct from grade reduction. It reaches a territory not previously provided with railroad facilities, traversing a fertile agricultural district, and skirting the hilly territory adjacent to the Ohio River, in which quite a mineral business is being developed.

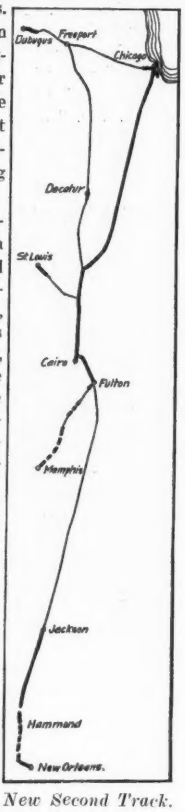
The new branches which are being built in the Delta country, south of Memphis, form a portion of the new low-grade line from Memphis to New Orleans, and they also traverse a country which is developing rapidly, so that the object of their construction is two-fold. The Lake Cormorant line, which has recently been completed, extends from Lake Cormorant, shown on the map as being about 20 miles south of Memphis, on the Yazoo & Mississippi Valley, to Tutwiler. The latter point is located on the branch of the Yazoo & Mississippi Valley running from Clarksdale to Greenwood, Miss. The Lake Cormorant line is 67 miles long, and has a maximum gradient of 16 ft. to the mile, and maximum curvature of 3 deg.

From Yarborough station, on this same branch, a cut-off is also being built to Swan Lake, on the branch from Tutwiler to Greenwood. It is 21 miles long and saves seven miles of distance, without increasing the ruling grade.

The completion of the link now building from Belzona to Yazoo City, will open up a connection through to the junction at Jackson for the branch line south from Tutwiler, which has heretofore terminated at Belzona, without southern outlet. This line affords a characteristic example of the way in which points in the Delta have been reached and developed by the Illinois Central. A company known as the Yazoo Delta built a railroad from Moorhead to Ruleville, Miss., which was opened in 1897. Moorhead was a station on the Southern, and Ruleville was 20 miles north of it. The Illinois Central acquired the property in 1900, and the former Yazoo Delta Railroad now forms the center of the branch from Tutwiler to Yazoo City, the northern outlet having been built about the time that the old Yazoo Delta was taken over, while the southern outlet will be opened in the near future. The purpose of the line primarily is to develop the fertile country through which it passes, but it also affords an alternative low grade line south from Tutwiler. The possession of these additional routes, less direct than the main line, but low grade, and perfectly well adapted for handling through traffic, is of great assistance in avoiding freight congestion, and the branches also provide natural routes for much traffic originating upon them, with comparatively little demand on the main lines. Through traffic from the south can come north over a diversity of routes, according to the needs of the situation, all the routes coming together at Fulton, Ky., and then spreading out again. The system of cross-connections, by means of which a greatly extended use can be obtained from the alternative lines, is constantly being developed, and the capacity of the road for all kinds of traffic is very large.

The way in which the banana trade is handled will serve to illustrate this. New Orleans is a great port for fruit from the West Indies, and it will often happen that several steamers arrive at the same time, loaded with bananas which were shipped in varying stages of ripeness according to the urgency of the market. The accompanying photograph shows a "banana express," made up of 34 refrigerator cars, loaded with 433 tons of fruit. When the bananas are wanted immediately, these trains run from New Orleans to Chicago—923 miles—on a 33-hour schedule, which is only about eight hours slower than the fast passenger schedule, and gives eloquent testimony to the low grades. If there are plenty of bananas in the market, however, the refrigerating trains are run on a 60-hour schedule, or slower, if desired. The flexibility of the lines is such that special traffic of this sort can be accommodated without interfering with regular business.

Second track work is now in progress on the Tennessee and Louisiana divisions of the Illinois Central, and the accompanying sketch map indicates its location. Between Fulton, Ky., and Memphis, Tenn., 65 miles of second track is now being built, the total distance between these points being 122 miles. This line was referred to in the previous article as being a portion of the Huntington, Chesapeake & Ohio Southwestern trans-continental project, and the second track is being laid in connection with the grade reduction which is being done. Second track work is in progress between Fulton and Paducah Junction, Tenn., nine miles; from Trimble, Tenn., to Dyersburg, 17 miles; from Curve to Atoka, 32 miles, and from Millington to Woodstock, seven miles. When the present work is completed, more than half of this stretch will be double tracked, and the maximum grade will be 26.4 ft. per mile. This is a portion of the main line for all traffic that goes south by way of Memphis and the Yazoo & Mississippi Valley.



New Second Track.

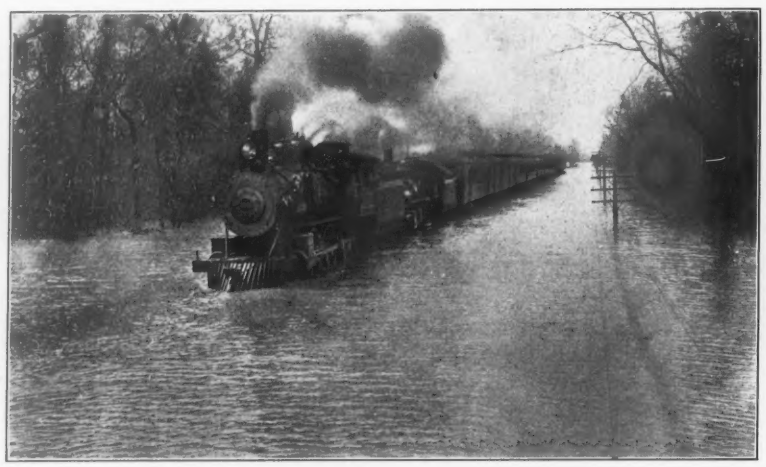
On the Louisiana Division, second track work is nearing completion from Jackson, Miss., to Manchac, 146 miles, and a portion of the grading is completed between Manchac and Kenner Junction, from which point second track is now in service to New Orleans, 10 miles. With the completion of the work now in hand, the entire main line from Jackson to New Orleans, 183 miles, will be second tracked, in addition to which the Yazoo & Mississippi Valley forms an alternative single track route. It will be observed that this double tracking, in connection with the new low-grade lines building between Memphis and Jackson, will make practically a double track line from Chicago to New Orleans, the two different routes being an equivalent thereof. On the entire system second track is distributed as follows:

Chicago to Fulton, Ky.	406 miles.
Jackson, Miss., to New Orleans	183 miles.
Total, between Chicago and New Orleans	589 miles.
East St. Louis to Belleville	14 miles.
Chicago to Hawthorne	9 miles.
East Junction to West Junction	3 miles.
Portage to East Dubuque	13 miles.
Total second track on system	628 miles.

The double track is all to be laid with 85-lb. rail, and ballasted with crushed limestone, which is quarried at Princeton, Ky., and at Ullin, Ill., and hauled to territory under construction, in Haskell & Barker side dump cars. It is unloaded with Lidgerwood unloaders. A photograph is shown of the quarry at Princeton. All the stone required is turned out on the company's lines, in addition to which excellent gravel is available.

Permanent bridge work is being carried on in connection with second track work and grade reduction, and will be discussed in a separate article.

Building the second track through the swamps immediately north of New Orleans has been the most difficult and expensive portion of the work. The character of the swamp is such that very little material can be obtained along the track. The bulk of it has to be hauled there, and it is necessary to make some provision for preventing the material used for embankment from slipping away into the water, as the entire ground is exceedingly low, and is more or less covered with water at all seasons of the year. Some striking photographs are shown of these low lines in the Mississippi swamp country, and further north, during the floods last spring. The system of levees along the Mississippi, from Memphis down, serve to make a great deal of trouble at times of extraordinarily high water. In former days, when the river was high, breaks would occur in the low land and a comparatively small area would be flooded; but with the present system of embankments, the river rises higher and higher, and breaks which now occur do vastly more damage than previously. Even when the levees hold, the small tributary rivers become so flooded that the back water does serious damage, and much of the trouble on the lines last spring was caused in this way. The plan adopted for retaining tracks in this kind of country was to spread over the ground to be occupied by the embankment, brush, old timbers and slabs of logs obtained from the mills, which acted as a sort of mattress, and which would support and hold together the embankment until the timber had decomposed and the bank had found a permanent



Crossing the Loosahatchie River Bottom, South of Woodstock, Tenn., March, 1903.

Rowing Down the Track, Y. & M. V., Near Lake View, Miss., March, 1903.

Probing for Holes; Wolf River, North of Memphis, March, 1903.

Overflow from Yazoo River, Y. & M. V., Near Kelso, Miss., March, 1903.

Slab and Brush Foundation, Work in Progress.

bed. The brush also takes root to a certain extent, forming an additional anchor. It is practically the same plan that was followed when the railroad was first built through the swamp, except that, at that time, a corduroy road was made, and the track laid upon it until it could be raised by material hauled over the line.

As distinguished from the prevailing low land in this district, the swamp territory embraces a distance of about 40 miles from New Orleans north. Near the north end of it, the line crosses a narrow pass known as Manchac Pass, which connects two lakes adjacent to the Gulf of Mexico. The accompanying photographs show the appearance of this brush mattress foundation, when it is first put down, and also after the ballasting has been completed on it.

In connection with the second track work now being done, a drawbridge will be built over this pass. A description of this will be given with other bridge work, in a separate paper.

The Care of Locomotive Boilers.*

Not very long ago my attention was attracted to the locomotive boiler because a large per cent. of locomotive failures was from boiler troubles. I naturally interested myself with the boiler-washers and then with the boiler-makers and finally with the engineers, firemen, hostlers, etc. I recently made the statement that boilers have suffered more damage from a lack of proper, intelligent care while out of service than they sustain while in service pulling tonnage over the road.

We have all known for years of the contraction and expansion of iron from varying temperatures; and we have been content with saying that leaks in boilers are caused by contraction and expansion. We have even gone so far as to state that the inequality of the contraction and expansion is really the cause of the trouble. I have, under my personal observation, boilers that have gone to the shops for new fire-boxes in one year from the time they were turned out of the locomotive works, when they should be good for eight or 10 years, with proper care. Fire-boxes made after the same blue-prints, that are older than the ones referred to above, are now, practically, in as good condition as the day they were built. And this difference has not been caused by "bad water," but by the difference in the treatment. No new boiler or fire-box should go to pieces or begin to deteriorate in even four or five years, much less one year, if it receives proper care.

Proper Cooling of Boilers.—There is a very common opinion that if a boiler is cooled for any other purpose than that of washing out, it is not necessary to be careful. The average practice is not to cool for even washing out or changing water. A boiler should always be cooled carefully. Here are two extreme methods of cooling a boiler. First: Open the blow-off cock, blow out all water and steam at the same time; then fill up with cold water. Second: Set the engine in the house with a full glass of water; close all ash pan openings tight; close the fire door; cover the smokestack, and allow the boiler to cool down until the water in the boiler is at a temperature of 60 deg. The first method is the worst that possibly could be used. I realize that the second method cannot be followed in practice at all times. What I would advocate is keeping just as close to it as possible, and as far away from the first method as we can. The best boiler work could not hold under treatment by the first method, while a boiler treated always by the second method would give as near perfect performance as possible.

A boiler with 200 lbs. of steam should be given at least 1½ hours to cool to no steam pressure, and the boiler should be well filled with water all the time. Water should stay well above the crown-sheet until the water in the boiler is cooled to 90 deg. in summer, and to 70 deg. in winter. The reason for this is that wash and filling water will average from 20 deg. to 30 deg. colder in winter than in summer. This applies where water is used from streams or tanks. Where it is pumped from deep wells there will not be this difference. It is a well-known fact that boilers leak more in winter than in summer. Many consider a boiler cool when the steam is gone, and draw the water out. It is just about half cool, for it is 176 deg. from 388 deg. (200 lbs. steam) to 212 deg. (no steam); and it is 152 deg. from 212 deg. to 60 deg., the temperature of average wash water.

Washing of Boilers.—Every effort should be used to make as many miles between washouts as possible. When a boiler needs washing it should be cooled carefully and washed thoroughly. Every washout plug in the boiler should come out. It is very bad practice to wash the belly of the boiler one time, the crown-sheet another time, and so on. It is a serious matter cooling a boiler, and when it is cool, the washing should be thorough. It will run enough longer the next time to pay for it. It should never be blown out through the relief valve holes in 10 or 12 minutes. Steam may be reduced by blowing through muffled whistle, or valve on whistle, or through feed pipe with hose down or into tank. After steam is gone, the cooling should be done by putting cold water in through the boiler check and injector throttle, and letting it out of blow-off cock in water leg, until the water coming from the blow-off cock is 90 deg. in summer, and 70 deg. in winter. Water must remain above the crown-sheet all this time, and preferably as high as the base of the dome. The general rule in cooling should be to put the cold water into the boiler as high up as possible, and take the hot water out as low down as possible, because cold water will not go up, nor will hot water go down. By the above practice you force a condition that will cool your boiler very uniformly. I suggest putting the water in through the boiler check and injector throttle, not because it is best, but because it

*Abstract of a paper by Mr. M. E. Wells presented to the Pacific Coast Railway Club, July 18, 1903. This paper received second prize in the competitive test recently instituted by the club.

Slab and Brush Foundation, Completed.

Quarry of the Katterjohn Construction Co., on the Illinois Central, Near Princeton, Ky.

does very well with the present construction of boilers. A better arrangement would be to cut the water off from the boiler check, and put it all through the injector throttle, or arrange an independent connection for putting it in through the dome.

If the fire-box has an arch, water should not be drawn below the crown-sheet under four or five hours (according to the size of the arch) after the fire is removed. This includes the time used in reducing the steam and cooling, as mentioned above. When the boiler is cool remove all mud-ring plugs and let out water. The crown sheet can be washed as soon as the water leaves it. Belly plugs in the bottom of the barrel of the boiler should not be removed until all water is out of mud ring. By removing them after this, one can tell if there is a bank in the belly of the boiler. If there is, water will run from these holes after plugs are removed. The belly should be well washed, and lastly the mud-ring. The following places should be watched carefully for mud and scale banking. Over fire-doors, on belly and flue sheet braces, just above front mud-ring, and from there forward about one-third the length of the barrel; also on the crown-sheets of engines having crown bars. Boiler washers should inspect boilers with a torch, through plug holes, to see if they are clean, and also to familiarize themselves with the internal construction, so that they can wash to better advantage. In washing through all plug holes the nozzle should be turned so as to wash down all sediment that may have collected on flues, braces, and staybolts. Plugs should always have mixed oil and graphite put on them before screwing in. Then screw in with the fingers as far as they will go; and they should go within a very few turns of being tight. This practice will insure not getting plugs in cross threaded. They should not be screwed in with a long wrench and as hard as a man can pull. A 16-in. wrench, used with one hand, makes them tight enough. The plug will last longer, will not leak, and will come out so much easier the next time. A shoulder is put on many plugs by being pulled in too tight. Then time is lost getting them out. Be careful to wash as long as you are getting anything. Some boiler-washers lose a good deal of time and water by washing long after any good is being done.

Corrugating of Side-Sheets.—The corrugating and cracking of the side-sheets in locomotive fire-boxes is one of the worst results of improper treatment. This is done in the roundhouse by cooling the boiler down too quickly. It is done, in most cases, by getting the steam off as quickly as possible, and letting the hot water out immediately; or it is sometimes done by blowing both steam and water out at once. This process leaves the sheets hot; and if there is a brick arch, the side-sheets are very hot. It is impossible to get cold water into a boiler that is in this condition and make the contractions in all the sheets uniform. In whatever way the water is put in, it goes to the mud-ring, cooling and contracting it; and with the contraction of the mud-ring the lower edges of the fire-box sheets are contracted. As the boiler is filled up, this cooling and contracting travels up the sheets, and there is a constantly changing line, below which the iron is at an average temperature of about 60 deg., while the sheets above the water-line are of varying temperatures, according to whether the fire-box has a hot brick arch resting against its sides. I have taken the temperature of a brick arch two hours after the fire had been removed. The boiler had been washed out, and was being filled up with water at a temperature of 60 deg. The brick arch showed a temperature of 260 deg. Imagine a boiler being filled and the water standing a foot deep on the mud-ring; in the fire-box is an arch having a temperature of 260 deg. resting against these side-sheets; below his water-line the temperature is 60 deg.; above the water-line it is practically 260 deg. What will this do to the side-sheets? Heat a piece of No. 8 iron uniformly hot, not red, and immerse 4 in. of one edge in water at 60 deg. Repeat this operation a dozen times, and you will have a beautifully bulged piece of iron above the water-line. And is this not just what the side-sheets do under similar treatment? The reason the side-sheets bulge between the staybolts, and have a corrugated appearance, is because the sheet is tied at the staybolts, and cannot come out. But think of the strain on the staybolt threads. Cases have been reported where the sheets were strippd off the bolts. This is the principal cause of leaky staybolts.

Cracking of Side-Sheets.—The corrugating being explained, the cracking of the side-sheets in fire-boxes follows as a matter of course. Calculating the tensile strength of boiler-steel at 60,000 lbs. per sq. in., it takes a strain of 22,500 lbs. per vertical inch to crack a ⅜-in. side-sheet. No such strain is ever in a side-sheet when it is put in a new fire-box. Then how does this strain get into these sheets to rupture them? The bulges being made at a low temperature, they cannot be made without taking up material lengthwise. You cannot wrinkle a piece of paper without making it shorter. It is this taking up of metal by the bulging that puts this tremendous tensile strain in the side-sheets. The cracks begin to show at the top and bottom of the staybolt holes, because these are the points of least resistance. A side-sheet in this condition, and cold, will rip open for as much as 3 ft. from a slight jar. It is usually caused by a blow from a hammer, although they have been known to rupture with no one near. The corrugating of side-sheets can be accomplished, when the fire-box carries a brick arch, in less than a year; whereas, without the brick arch it takes three or four years—both cases assuming the same improper treatment. Side-sheets always crack when they are cold, and there is a common idea that the cooling at the time, or immediately before the cracking, caused the rupture. Each improper cooling the boiler received from the time the fire-box was new contributed to the final cracking.

Leaking of Crown-Bolts and Leaking and Breaking of Staybolts.—It has, doubtless, been your experience that the crown-sheets supported by crown-bars resting on the top edges of the side-sheets do not give the trouble that the crown-bolts do that go through to the outside shell. This is because the fire-box with crown-bars could come and go and not disturb the joints in the crown-sheet; but with the crown-bolts that go from the outside shell it is different. The fire-box and outside shell, if not contracted uniformly, will put a great strain on the crown-stays, and the threads and joints in the crown-sheet are disturbed, and they leak. We have demonstrated in our work that crown-stays, well put in, will not leak when boilers are properly cooled. It also is this inequality of the coming and going of the fire-box and outside shell that breaks staybolts in the sides of fire-boxes. By cooling boilers properly few staybolts will be broken, and leakage of crown and staybolts will be decreased.

Leaking of Flues.—Leaky flues, like most leaks in boilers, are caused by inequalities in contraction. It is the inequalities of contraction, more than of expansion, that cause boiler disorders. One of the principal causes of leaky flues is the varying temperatures of the water in different parts of the boiler under different circumstances, the present method of introducing feed-water into the boiler being the source of a large amount of trouble from leaky flues. Varying temperatures outside the water-space cannot have much influence in causing leaks. It is the varying temperatures inside the water-space that really change the temperature of the boiler-metal and cause inequalities of contraction.

Incrustation.—By the careful cooling of our boilers to prevent inequalities of contraction, we builded better than we knew. By constantly watching the cooling and washing of the boilers, we discovered that the more carefully they were cooled, the more white mud came down to be washed out. Being interested to know what this white mud was, we took some of it to the laboratory for analysis, with this result:

Sulphate of lime ($CaSO_4$)	4.90
Carbonate of lime ($CaCo_3$)	32.62
Carbonate of magnesia ($MgCo_3$)	30.60
Silica (SiO_2)	1.12
Water (H_2O)	31.90

It is made up largely of the carbonates of lime and magnesia, with a little sulphate of lime and water of crystallization. After following this cooling and washing for some months, it was very apparent that the scale from boilers properly cooled became less, and what there was of it was of a different texture from the usual boiler-scale, averaging only about the thickness of an egg-shell. We also discovered that when it got to this thickness it would detach itself and come down and wash out. We have all been taught that the sulphates of lime and magnesia make a harder scale than the carbonates. So when we found the carbonates coming down and washing out, we began to wonder how much of the carbonates went to make this egg-shell scale. In order to know this, we took two samples of scale from boilers that we knew had been properly cooled. Sample number one was taken from a boiler that was 20 months old, and the other from a boiler about three months old, both new from the factory, and running on divisions nearly 400 miles apart. The chemical analysis gave us the following:

	Sample No. 1.	Sample No. 2.
Water (H_2O)	11.24	22.78
Silica (SiO_2)	3.14	7.62
Al_2O_3 and Fe_2O_3	....	3.10
Calcium (CaO)	22.10	31.00
Magnesia (MgO)	24.10	7.68
Sulphuric acid (SO_3)	35.29	21.91
Undetermined	4.13	6.61

The analysis shows principally lime and magnesium sulphates. What did it mean? It meant that if we were right, we must reclassify what we have called incrusting matter, and instead of calling both the sulphates and carbonates of lime and magnesia incrusting, we must only name the sulphates as such. That is, with the right treatment of boilers. Of course, if we continue to blow boilers out hot, the carbonates will continue to go to the sheets and bake and form scale. And under these conditions, carbonates must still be classified as incrusting matter.

Bad Water.—Boilers, while yet in the "back shop," have been blown out hot, to get rid of the grease, filled with cold water, and fired up. At the first roundhouse they reached after leaving the shop, they were blown out hot, and filled up with cold water again. This is called "a change of water," and is one of the most damaging processes a boiler can be put through, when done in this manner. It changes the water, it is true, but it will just as surely make a leaky boiler. When this engine has been pulled in, "dead," off the road on account of leaking, the practice is to shake the head, and say, "bad water." Sometimes the boiler makers have been accused of poor work, when, in fact, it was neither poor work nor bad water, but bad treatment, that was to blame for the whole trouble. The boiler-makers have stood more than their share of the blame.

Here is another case where "bad water" is held responsible for damage done to boilers. You are all familiar with the little upright boilers that have short flues running from the crown-sheet in the fire-box to the top of the boiler. In order to get any steam space in these boilers, it is necessary for the upper ends of the flues to extend about one foot above the water-line, passing through the steam-space. These flues do not scale over, but corrode badly above the water-line, and, of course, heat badly. And we have all said, "bad water." This corrosion is easily explained by a simple chemical law, namely, the decomposition of water by heat and the affinity of oxygen for iron. These flues above the water-line get very hot, and a part of the steam forming around them is decomposed by this heat into oxygen and hydrogen. The hydrogen passes off with the steam, but the oxygen combines with the iron, oxidizing it, rusting it, actually eating it up, leaving a black scale or powder that is known as the magnetic oxide of iron (Fe_3O_4). It was not "bad water" that did this, because perfectly pure distilled water would have done the same thing. This cry of "bad water" has covered a multitude of sins. In fact, there are few troubles a boiler is heir to that have not been laid at its door. The truth in our case is that the best boiler performance on our road is on the division that has the worst average alkali water.

In a practical way, bad water only means foaming water. The carbonates and sulphates of soda (alkali), when they reach a certain degree of saturation in a boiler, begin to cause trouble by foaming. This degree of saturation we have determined by test to be from 175 to 200 grains of alkali per United States gallon. This would vary with different types of boilers. Some authorities say that foaming is caused by suspended matter in a boiler. I feel quite sure, from the present light on the subject, that it is alkali in solution. Two or three hundred grains of alkali dissolved in a gallon of water gives it a slippery, soapy feeling. That is, the water is not in condition to break easily and let the steam up through it. It clings together like a soap-bubble, and the water is then carried over with the steam, which is "foaming." I cannot find that alkali will do anything to a boiler except make it foam. It will not eat, or corrode, or scale, or cause leaks. The fact is that a perfectly pure water will cause more corrosion in a boiler than an alkali or incrusting water. This has been demonstrated in marine boilers, where it has been found that to use condensed water successfully, it is necessary to use an incrusting water at first to form a light scale over the sheets.

Corrosion.—Practically all the corrosion in a boiler is simple oxidation. There is nothing dark, deep, or mysterious about it. I say this because you find in boilers, as the products of this corrosion, nothing but the oxides of iron. There are three principal kinds found: First, the ordinary yellow iron rust, hydrated oxide of iron (Fe_2O_3 H_2O), which you see everywhere about you, and is found on the outside sheet of the boiler. Second, the above form with the water (H_2O) driven out, making it the red oxide of iron (Fe_2O_3). This is found on the fire-sheets and flues of a boiler, usually in pustules or pits. Then there is the black, or magnetic, oxide of iron (Fe_3O_4). A common example of this is the black scale seen around a blacksmith's anvil. This is usually found on the fire-sheets, and is the result of oxidation that takes place from overheating, on account of excessive scale or mud, or on account of electrolytic action. Since discontinuing the use of copper for flues and fire-boxes, the corrosion from oxygen produced by the electrolysis of water is practically nothing. There is still some corrosion from the copper ferrules used in setting flues, and I favor the use of a soft-iron ferrule. If we cool and wash our boilers properly, we will get rid of the possibility of corrosion from overheating caused by excessive scale or mud. The other two kinds of corrosion will not be got rid of as long as water is used in iron boilers. Care should be taken that the flues and boiler-sheets do not begin to corrode or rust before they are put into the boiler. This pustular corrosion or pitting eats into the iron, just as a cancer eats into a muscle of the body. And when it is once started, it very difficult to stop it. It is necessary to go to the bottom of each pit and clean out all the decayed matter, or iron rust.

Water Purification.—Water purification is attracting a great deal of attention at this time, on account of the very general opinion that bad water is causing the boiler troubles. Railroad companies should be very sure of the cause of trouble before spending large sums of money on water purification. The proper care of boilers will do more than water purification without proper care.

The C., C., C. & St. L. Roundhouse at Cincinnati, Ohio.

At the recent meeting of the Master Mechanics' Association some interesting information was given of the comparative results obtained in roundhouse heating by the use of steam pipes and the blower system. It appeared from the discussion that the blower system acts as a fog preventative in cold weather and that, with it, the roundhouse is clear at all times; while, where steam pipes are used in the pits, a great deal of trouble is experienced with condensation and mist.

Apropos of this we show an interior view of a roundhouse lately built by the Big Four at Cincinnati that is heated by the Sturtevant blower system. The fan is 5 ft. 6 in. in diameter and 3 ft. wide, and is driven by a horizontal engine with a cylinder 6 in. in diameter and 6 in. stroke. The heater consists of eight sections coupled together in two groups and contains 3,500 ft. of 1 in. piping.

The hot air piping is led from the fan as one large conduit which is reduced in size according to the distance from the source of supply, and is led down in 10 in. pipes

Interior of C., C., C. & St. L. Roundhouse at Cincinnati.

alongside the posts supporting the roof as shown in the engraving.

From the foot of the posts the piping runs beneath the floor to the pits, which it enters through oblong openings about midway the height. There are two of these openings on each side which may be controlled by dampers so that the flow may be cut off from unoccupied pits.

In cold weather it therefore becomes possible to direct a blast of warm air directly beneath an engine that is covered with ice and thus rapidly remove the same, and, at the same time, avoid the discomfort and dangers of the fog that is usually created by the steam pipe method of heating the pits of roundhouses.

Train Accidents in the United States in July.[1]

bc, 1st, Virginia & South-Western, Spear's Ferry, Va., butting collision of freight trains, wrecking both engines and many cars. One fireman was killed and two other trainmen were injured, one of them fatally.

dr, 1st, Huntingdon & Broadtop Mountain, Beaver, Pa., the locomotive of a freight train was derailed at a frog which appears to have been broken, and the engine and 17 cars were wrecked. A number of cars fell into a river. The fireman was severely scalded and three trainmen were injured.

unf, 1st, Texas & Pacific, Forney, Texas, a work train, with the engine at the rear, was derailed by running over a cow, and 10 loaded cars were ditched. The conductor and one brakeman were injured.

xc, 3d, 2 a.m., Chicago, Rock Island & Pacific, Peoria, Ill., collision between a freight train and a switching engine, badly damaging both engines and seven cars. One fireman was killed and one engineman injured.

unf, 3d, 2 a.m., Gulf, Colorado & Santa Fe, Gainesville, Texas, passenger train No. 6 was derailed at a point where the roadbed had been weakened by a flood. The engineman was killed.

xc, 4th, New York, Central & Hudson River, Buffalo, N. Y., passenger train No. 29 collided with a switching engine, making a bad wreck. Two employees were killed and one injured.

dr, 4th, St. Louis Southwestern, Red Water, Texas, a freight train was derailed, apparently by excessive speed over defective track, and 12 cars broke through a trestle bridge and, with the engine and tender, were wrecked.

eq, 4th, Southern Railway, Luttrell, Tenn., the caboose of a freight train was derailed and wrecked and the brakeman was killed. The train was being pushed by an engine which was next behind the caboose, and the derailment is said to have been due to the crushing of the caboose in consequence of the insufficient strength of its floor timbers.

unx, 5th, Northern Pacific, Dellwood, Minn., the locomotive of a freight train was derailed and overturned, and the engineman was killed.

dn, 6th, Wabash road, Steubenville, Ind., passenger train No. 63 was derailed at a derailing switch and the engine and first two cars were overturned. The fireman was fatally injured and seven passengers were slightly hurt.

unf, 6th, 1 a.m., North Shore Railroad, Camp Pistolesi, Cal., a passenger train, drawn by two engines, was derailed by running over the carcass of a cow, and one of the engines fell down a bank. One engineman was killed and two firemen were injured. It is said that the carcass had been maliciously placed on the track.

†bc, 7th, 3:12 p.m., Southern Railway, Rockfish, Va., butting collision between southbound passenger train No. 35 and northbound local freight train No. 68, wrecking both engines, several freight cars and the baggage car, express car and second-class passenger car of No. 35. This passenger car was filled with immigrants and colored persons. Nineteen of these passengers were killed and five were injured. The engineman of the passenger, the fireman and one brakeman of the freight and one other trainman were killed, and one trainman was injured. The passenger train was running at high speed; the freight had just stopped preparatory to backing into the side track. The conductor and engineman of the freight had been notified that the passenger would be 20 minutes late but they misread the order, reading it 1 hour 20 minutes.

bc, 7th, Pennsylvania, Berlin Center, Ohio, butting collision between a passenger train and a freight; passenger fireman killed, and one passenger and four trainmen injured.

unx, 7th, Northern Pacific, Detroit, Minn., a passenger train was derailed and the engineman was killed.

bc, 8th, Southern Pacific, Aromas, Cal., butting collision of passenger trains, badly damaging both engines and several cars; five passengers injured. It is said that the northbound train was running in disregard of a telegraphic meeting order.

rc, 9th, Missouri Pacific, Nevada, Mo., passenger train No. 5 ran into the rear of a preceding freight train, damaging the engine and several cars; two passengers and one trainman injured.

bc, 9th, Chicago, Milwaukee & St. Paul, Amana, Iowa, butting collision of freight trains, wrecking both engines and 17 cars. Two trainmen and a tramp were killed and two other trainmen were injured. It is said that the collision was due to misreading of a telegraphic order.

†10th, Terminal Railroad Association, Madison, Ill., a passenger train carrying 600 workmen from St. Louis to the factories in Madison and Granite City was derailed on a trestle and one coach was overturned, lodging on the tracks of the Chicago & Alton and slightly damaging a passenger train on that road which was passing at the time. One passenger was killed and four were injured, one of them fatally. It is said that the trestle and the track on it had been damaged or weakened by recent floods.

rc, 11th, 1 a.m., Pennsylvania road, McVeytown, Pa., westbound passenger train No. 7, moving at high speed, ran into the rear of a preceding freight train, damaging the engine and several cars. Four trainmen were injured.

†bc, 12th, 10 a.m., Missouri Pacific, Lee's Summit, Mo., butting collision between an eastbound excursion train and westbound mail train No. 7. The westbound train was moving at high speed, but the other was at a standstill: both engines and several cars were badly damaged. One passenger and one tramp were killed and about 40 passengers were injured. It is said that a flagman had been sent out from the standing train to stop No. 7, but that his signal was not seen by the engineman.

bc, 12th, New York Central & Hudson River, Brewsters, N. Y., butting collision between a southbound passenger train and a northbound freight, badly damaging both engines and several freight cars.

dn, 12th, Southern Railway, Saluda, N. C., a freight train descending a steep grade became uncontrollable and ran at high speed several miles to a curve, where the engine and 14 cars were derailed and fell down a high bank.

unx, 12th, Seaboard Air Line, Greenwood, S. C., a passenger train was derailed and two passenger cars were overturned. Several passengers were injured, none of them seriously.

unx, 12th, 11 p.m., Great Northern, Brushville, Minn., passenger train No. 10 was derailed and three passenger cars were overturned. One passenger and one trainman were injured.

o, 12th, Union Pacific, Colores, Wyo., the locomotive of a freight train was wrecked by the explosion of its boiler and the engineman was killed.

xc, 13th, Grand Crossing, Ill., collision between a freight train of the Michigan Central and one of the Chicago Great Western, overturning the Michigan Central engine. Two trainmen were injured.

unx, 13th, St. Louis, Iron Mountain & Southern, Prescott, Ark., a freight train was derailed while passing over a trestle bridge and 25 cars, with most of the bridge, were wrecked. Two brakemen were injured.

bc, 14th, 4 a.m., Baltimore & Ohio, Sheffield, Ohio, butting collision of freight trains, wrecking both engines and many cars. One brakeman was killed and two other trainmen were injured.

bc, 14th, Rutland road, North Bennington, Vt., butting collision between a passenger train and a freight, damaging both engines. Three passengers were injured.

xc, 14th, 4 a.m., Pennsylvania road, Bolivar, Pa., a live stock train running at good speed ran into a slow freight train, wrecking the engine, six cars of cattle and 10 cars of merchandise. A tramp was killed and the fireman and four tramps were injured.

dr, 14th, Delaware & Hudson, Loon Lake, N. Y., a passenger train was derailed at switch which had been left unfastened: the fireman was injured.

xc, 15th, Central of Georgia, Carrollton, Ga., a passenger train which had been unexpectedly stopped, was run into by a work train moving backward, making a bad wreck. Two laborers were killed.

unx, 15th, Virginia & Southwestern, Butler, Tenn., a freight train was derailed and the engine and several cars fell down a bank. The fireman was killed and the engineman badly injured.

o, 15th, Union Pacific, Otto, Wyo., the locomotive of a freight train was wrecked by the explosion of its boiler, and six cars were damaged. The engineman and fireman were injured, the latter fatally.

o, 15th, Southern Pacific, Alameda, Cal., the locomotive of a passenger train was wrecked by the explosion of its boiler, and the engineman and fireman were injured.

xc, 15th, Clinton, Mass., a passenger train of the Boston & Maine ran into a passenger train of the New York New Haven & Hartford at the intersection of the two roads, and three passengers were injured.

eq, 15th, Missouri Pacific, Dodson, Mo., passenger train No. 1 was derailed and the engine and three passenger cars were ditched. Ten passengers were injured. The derailment is said to have been due to a loose wheel.

†xc, 16th, Chicago & Eastern Illinois, Shelbyville, Ill., 20 cars of a circus train which was being pushed into a side track became uncontrollable, and ran down grade some distance and collided with some empty freight cars, badly damaging the freight cars and derailing and ditching a sleeping car. The sleeper was full of men and was overturned, but its occupants sustained no serious injuries. In attempting to recover and stop the runaway cars, a large number of cars were damaged and many valuable horses within them were injured. One circus man was killed and six others were injured, one of them fatally.

unx, 18th, New York, Ontario & Western, Starlight, Pa., a freight train consisting of an engine and 49 cars of coal, of which 39 cars were equipped with air-brakes, connected up, became uncontrollable on a 1½ per cent. descending grade and was almost entirely wrecked by being derailed at various points along the line. After the train attained a speed too high for the curves of the line, the cars, one or two or a few at a time, were derailed and fell into the ditch or down the bank. The engine was badly damaged by the breaking of the connecting rods, and was finally overturned. The engineman and fireman were injured, the latter fatally.

xc, 18th, 9 a.m., Great Northern, Watertown, S. Dak., passenger train No. 58 ran over a misplaced switch and collided with a freight engine standing on the side track. Three trainmen and a boy were injured, the latter fatally.

xc, 18th, El Paso & Southwestern, Douglas, Ariz., several cars of a freight train ascending a grade broke away and ran back down grade some distance and collided with some freight cars. Three employees were badly injured.

o, 18th, Norfolk & Western, Pearlsburg, Va., passenger train No. 1, while passing a powder magazine was damaged and shocked by the explosion of the magazine. Fifteen passengers were injured and every person on the train was stunned. Two laborers at work on the track were killed.

xc, 19th, Cincinnati, Ohio, a passenger train of the Cincinnati, New Orleans & Texas Pacific backed into a passenger train of the Baltimore & Ohio Southwestern as the latter was approaching the Grand Central station. The collision appears to have been due to the inability of the brakeman, who was piloting the first-named train, to stop, after he saw that a cross-over switch in his path was misplaced. The air had been exhausted so that the brakes could not be applied. Several passenger cars were badly damaged and 12 passengers were injured.

rc, 21st, Georgia R. R., Atlanta, Ga., passenger train No. 1 ran into the rear of a preceding freight train, wrecking the caboose. The engineman and fireman were injured.

o, 21st, 4 a.m., Missouri, Kansas & Texas, Colbert, Ind. T., the locomotive of a freight train was wrecked by the explosion of its boiler, and the fireman was scalded.

*bc, 21st, Cincinnati, New Orleans & Texas Pacific, Lexington, Ky., butting collision of freight trains, each of which was drawn by two engines. The wreck took fire and several loaded cars were burned up. One trainman was injured.

xc, 21st, 1 a.m., Philadelphia, Baltimore & Washington, Wilmington, Del., a southbound express train ran into a freight train at a crossing and the passenger engine was overturned. Several cars were wrecked and five trainmen were injured.

xc, 21st, 10 p.m., Chicago & North Western, Weeden's, Wis., a freight train, descending a steep grade, broke in two and the rear portion afterward ran into the forward one. Three trainmen were injured, two of them fatally.

dr, 21st, Chicago, Rock Island & Pacific at Forty-eighth street, Chicago, the engine and two cars of a passenger train were derailed at a defective switch. One of the cars took fire from illuminating gas which escaped and became ignited, and the car was burned up. Three trainmen and one passenger were injured.

dn, 21st, Louisville & Nashville, Boyles, Ala., a freight train was derailed at a switch which had not been fastened, and 12 cars were wrecked. A boy walking along the track was killed.

unf, 21st, Savannah & Statesboro, Blitchton, Ga., a train consisting of a locomotive and one passenger car, running backward, without passengers, was derailed by running over a bull. Three trainmen were injured.

xc, 22d, Philadelphia, Baltimore & Washington, Edgemoor, Del., an engine and caboose, moving backward in the yard, collided with another caboose, and two employees were killed.

o, 22nd, Baltimore & Ohio, Waverly, W. Va., the locomotive of a freight train was wrecked by the explosion of its boiler, and four employees were injured.

rc, 23rd, 1 a.m., Seaboard Air Line, Southern Pines, N. C., a passenger train ran into the rear of a preceding freight, damaging the engine, caboose and three cars. The engineman and fireman were injured.

bc, 23rd, Southern Railway, Auburn, N. C., butting collision between a freight train and an empty engine which was standing at a tank. One trainman was fatally injured.

eq, 23rd, Southern Railway, Whitesburg, Tenn., a freight train was derailed by the breaking of an axle and nine cars were wrecked. The conductor was killed.

xc, 24th, Atchison, Topeka & Santa Fe, Overbrook, I. T., collision between a freight and a work train, making a bad wreck. Five trainmen were injured.

xc, 24th, 8 p.m., Southern Railway, Tucker, Ky., a southbound passenger train ran over a misplaced switch and collided with some freight cars, wrecking the engine, two freight cars and a boarding car standing on the side track. Eight employees were injured. It is said that the switch had been maliciously misplaced.

xc, 25th, Columbus, Ohio, collision between a passenger train of the Cleveland, Akron & Columbus and a switching train of the Norfolk & Western, badly damaging both engines. Three passengers and five trainmen were injured.

xc, 25th, Hutchinson, Kan., a passenger train of the Atchison, Topeka & Santa Fe collided with a freight of the Missouri Pacific at the crossing of the two roads, wrecking several freight cars and two baggage cars. Sixteen persons on the Missouri Pacific train were injured, two of them fatally.

25th, Pennsylvania road, Mifflin, Pa., an empty engine was derailed, apparently by some defect in the track, and was overturned. The engine fell against a freight train moving in the same direction on the adjacent track and 16 loaded freight cars were wrecked. The engineman was killed.

rc, 26th, Cleveland, Cincinnati, Chicago & St. Louis, Wellington, Ohio, a passenger train moving at high speed

[1] Accidents in which injuries are few or slight and the money loss is apparently small will as a rule be omitted from this list. The official accident record published by the Interstate Commerce Commission quarterly is regularly reprinted in the *Railroad Gazette*. The classification of the accidents in the present list is indicated by the use of the following

ABBREVIATIONS.

rc	Rear collisions.
bc	Butting collisions.
xc	Miscellaneous collisions.
dr	Derailments: defect of roadway.
eq	Derailments: defect of equipment.
dn	Derailments: negligence in operating.
unf	Derailments: unforeseen obstruction.
unx	Derailments: unexplained.
o	Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

ran into the rear of a preceding freight train; and the engine, caboose and 10 cars were badly damaged. One passenger and two trainmen were injured.

rc, 26th, Southern Railway, Covesville, Va., passenger train No. 10, which had been unexpectedly stopped, by a freight train ahead of it, was run into at the rear by a following freight train; and the rear passenger car, well filled with passengers, was crushed violently against the car ahead of it. Eleven passengers were injured.

†bc, 26th, Chicago Great Western, Vlasaty, Minn., butting collision between a passenger train and a freight, wrecking both engines and many cars. One passenger and three employees were killed and 25 passengers were injured. The freight train had received an order allowing it to proceed on the time of the second section of the passenger train, which was three hours late, but the order appears to have been misread; to have been taken as meaning all of the sections of the passenger train.

bc, 27th, Cincinnati, Hamilton & Dayton, Tadmore, Ohio, butting collision of freight trains, badly damaging both engines and several cars. One engineman and one fireman were injured.

o, 27th, Grand Rapids & Indiana, Michigan City, Ind., a car in a passenger train was badly damaged by a guard rail which was forced upward through the floor while the train was running at speed, and four passengers were injured. The guard rail had been dislodged by a tire of one of the driving wheels of the engine of the train, which came off.

rc, 28th, Southern Railway, North Garden, Va., passenger train No. 10, which had been unexpectedly stopped by a freight train ahead of it, was run into in the rear by a following freight, making a bad wreck. The two passenger cars at the rear of the passenger train were badly damaged and the whole train was pushed forward, wrecking the caboose of the freight which was in front of the passenger train. Six passengers were injured.

xc, 28th, Southern Railway, Springfield, Va., a passenger train collided with a work train which had escaped control on a side track and had fouled the main track, and both engines were wrecked, the passenger engine being overturned. One postal clerk and one fireman were killed and one passenger and six trainmen were injured.

unx, 28th, Virginia & Southwestern, Mendota, Va., passenger train No. 2 was derailed and the engine and first two cars fell down a bank. Three passengers and three trainmen were injured.

unf, 31st, 11 p.m., Galveston, Houston & Northern, Pasadena, Texas, an excursion train was derailed by running over a cow, and the engine fell down a bank. The baggage car was wrecked; the fireman was killed.

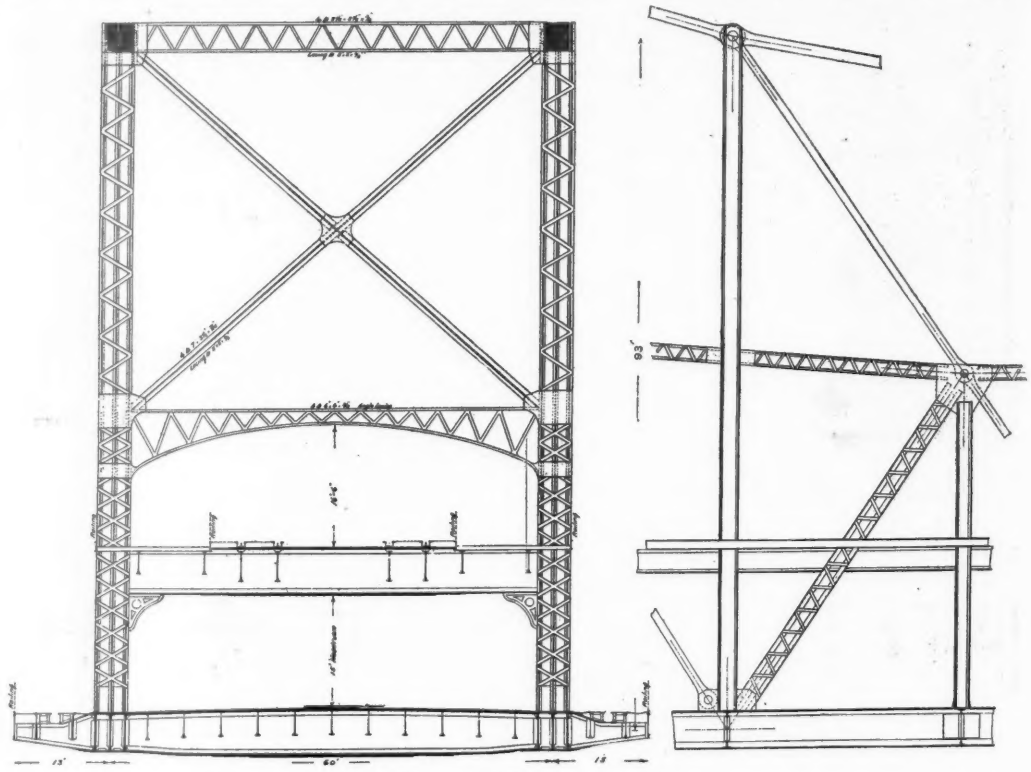
unx, 31st, Chicago & Eastern Illinois, Brazil, Ind., the tender of the locomotive of a work train was derailed at a curve, and, with the engine, was overturned and fell into a creek. Two cars in which were a number of laborers were ditched. One brakeman was killed and 14 other employees were injured.

The Blackwell's Island Bridge.

The plans and specifications for the superstructure of the Blackwell's Island bridge across the East River to connect New York and Brooklyn have been issued by the Commissioner of Bridges, Mr. Gustav Lindenthal. Bids for the work will be opened on September 24, and on the awarding of the contract the bridge will be hurried to completion and probably opened for traffic early in 1906. The masonry piers are practically completed with the exception of the housings for the elevators and stairways connecting the roadway to Blackwell's Island.

This bridge, which is also known as No. 4, has had a long and interesting history. In 1884 a franchise was granted to Dr. Thomas Ranney to build a bridge across the river at this point. It covered all the rights and privileges for bridges across the island for a period of 17 years and had not expired when the present bridge was authorized in 1898. It is needless to say that the holder of the franchise had no more intention of building a bridge than did the East River Bridge Co., which held a similar franchise covering all sites for two miles up the river from the Brooklyn Bridge, and which realized $200,000 when the city bought back the right to build the Williamsburg Bridge now nearing completion.

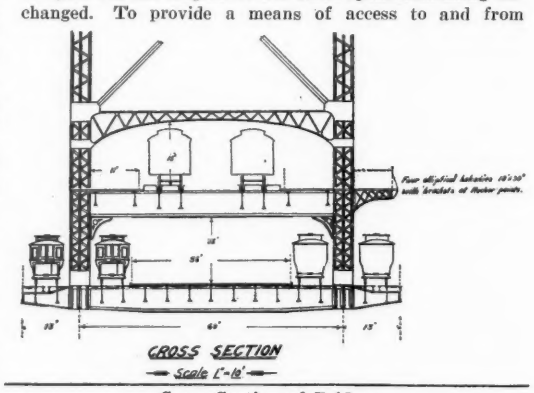
At a meeting of the Board of Public Improvements Nov. 23, 1898, the Commissioner of Bridges was authorized to prepare plans for a bridge over the East River, and in December, 1899, the plans as drawn up were



Section and Elevation of Panel 23.

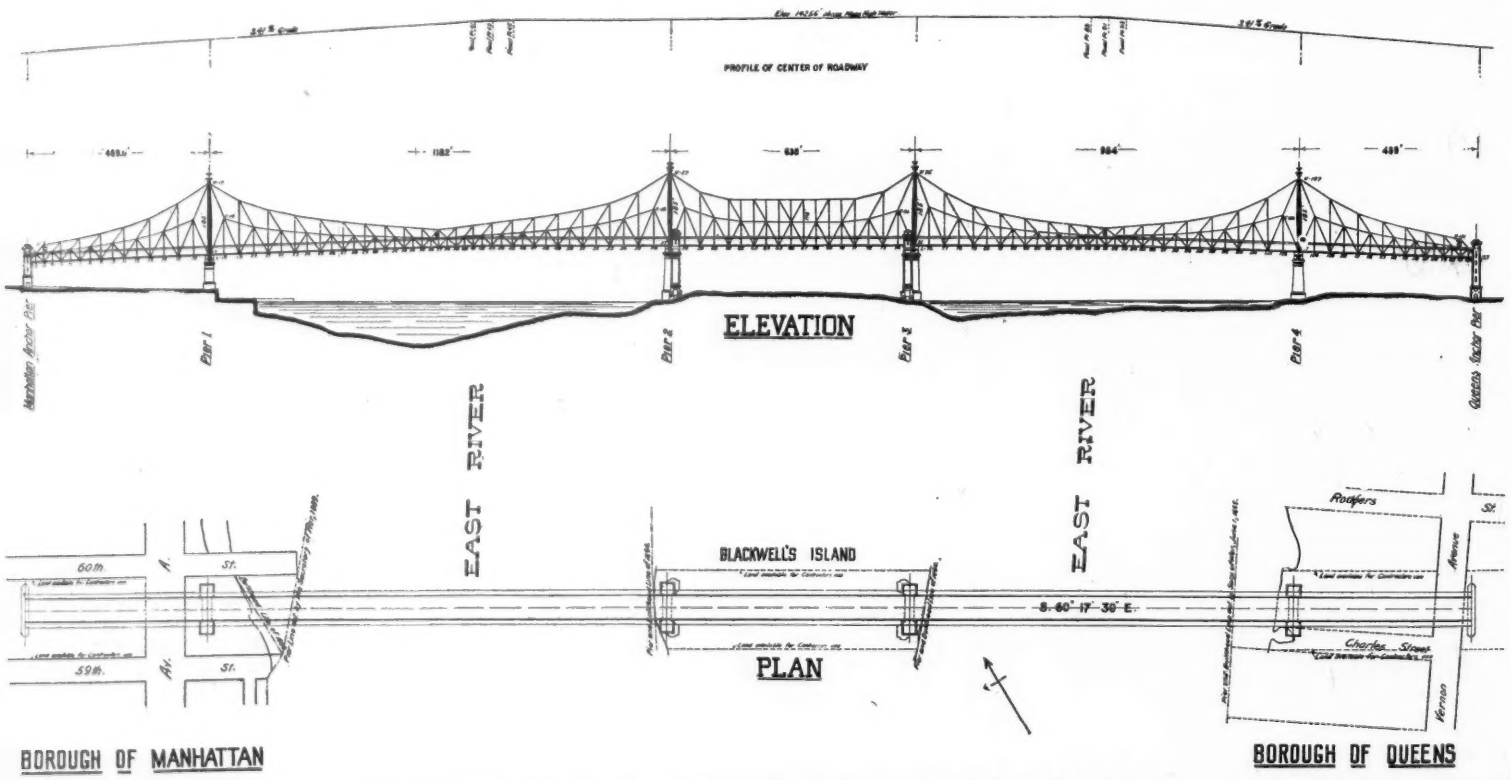
formally approved by the Board. The plans provided for a steel cantilever bridge of five spans, one across Blackwell's Island, two over the river channels and two anchor spans. The location selected was from the corner of Second avenue and 60th street in Manhattan to a point near Jackson avenue in Queens, crossing the river at a height of 118 ft. above mean high water. The maximum grades were fixed at 3.8 per cent. on the New York approach and 3.2 per cent. on the Brooklyn end. The total length was 7,636 ft., including the bridge spans and approaches, and the estimated cost of the work, $12,548,500, which included $3,148,500 for land to be condemned for approaches and abutments. Mr. John L. Shea was then Commissioner of Bridges and Mr. Samuel R. Probasco, Chief Engineer, with Mr. R. S. Buck as Chief Engineer in charge. A description of these plans and details of the substructure were given in the *Railroad Gazette* Aug. 16, 1901.

On June 1, 1901, proposals were asked for the substructure according to the original plans, and on June 27, the contract was awarded to Ryan & Parker for $745,547. Construction began late in September of the same year, but little actual work was done up to January, 1902, at which time the estimated value of the completed work was $42,000. On June 23, 1902, work was ordered stopped because of a change in the plans of the superstructure, which were being revised by the new Bridge Commissioner, Mr. Gustav Lindenthal. Work was in progress on only four of the piers, the sites for the other two not having been secured by the city. The changes in the superstructure involved only minor changes in the piers already built and on the resumption of work in the fall these were covered by special contracts. The principal change was in the length of the west channel span, which was increased from 1,131 ft. to 1,182 ft., the lengths of the other spans remaining unchanged. To provide a means of access to and from Blackwell's Island a system of elevators and stairways was planned which involved some changes in the two piers on the island. Otherwise the work done up to that time was not affected by the alterations.



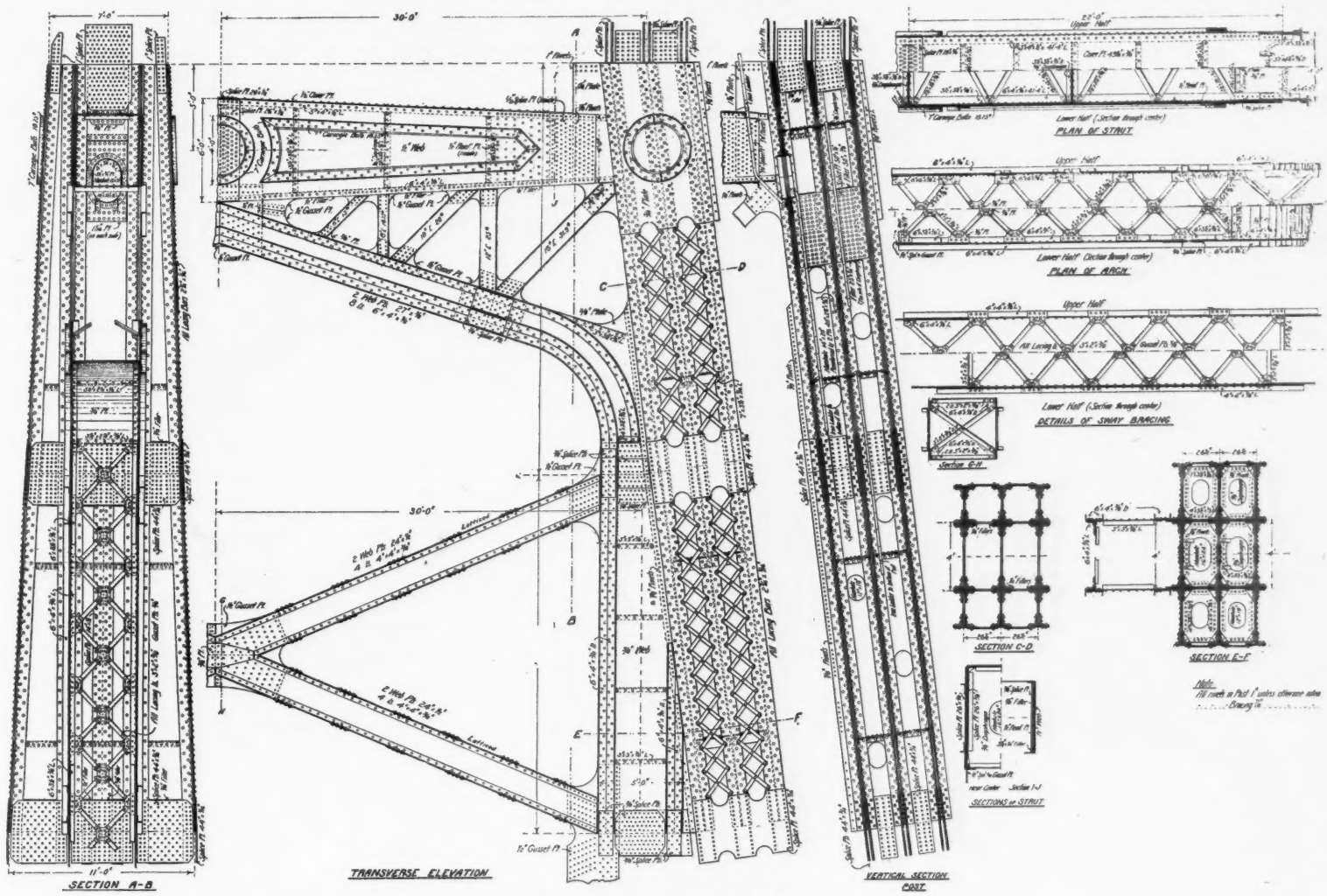
Cross Section of Bridge.

The new plans for the superstructure were formally



Plan and Elevation of Blackwell's Island Bridge Across the East River, New York.

approved by the Bridge Commissioner on August 1, 1903, and specifications prepared in accordance with them. The accompanying engravings show the general plan and elevation of the bridge and some of the more



Details of Post and Bracing at Piers.

important details. It will consist of two lines of cantilever trusses, 60 ft. from center to center, divided into two shore spans of 469½ ft. and 459 ft., two river spans of 1,182 ft. and 984 ft. and one island span of 630 ft. The top chord will consist of nickel steel eyebars varying in width from 12 in. to 18 in., and the bottom chord will be of box form. The floor will be of buckled plates. The two channel spans will be among the longest truss spans in the world, both being longer than the Wabash bridge at Pittsburg, which is 812 ft., the longest in this country.

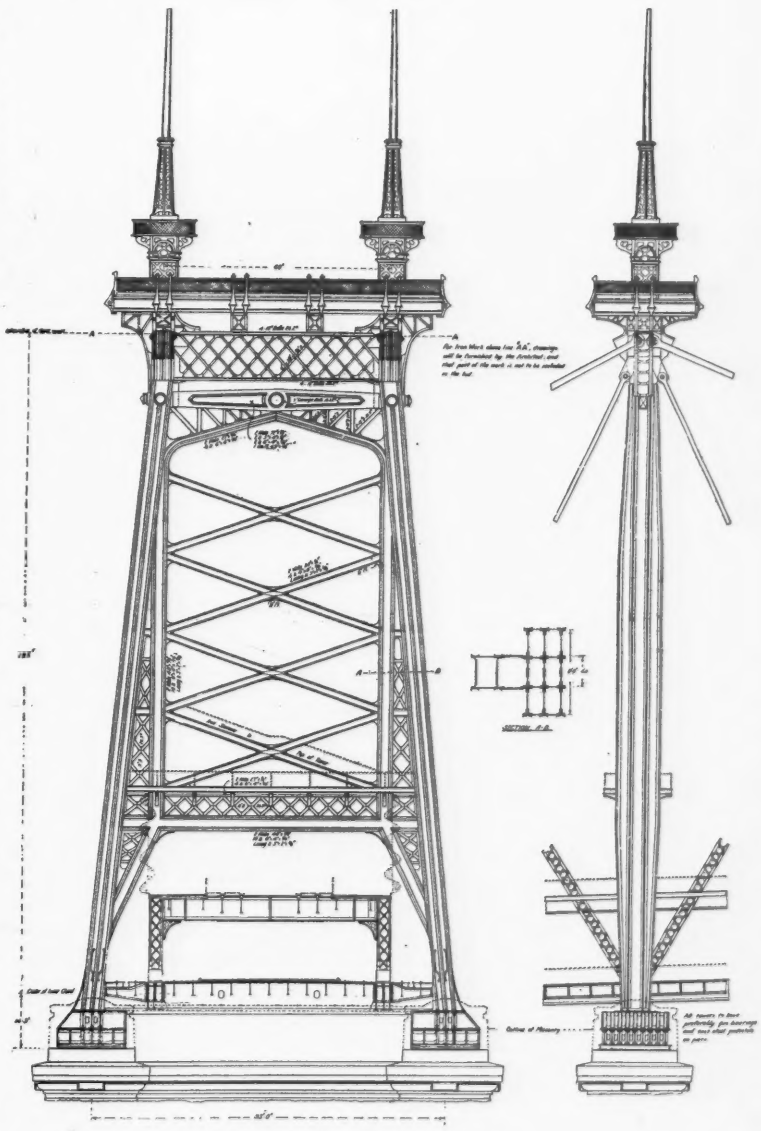
The general arrangement of tracks and roadways is shown on the cross section. Two elevated railroad tracks flanked on either side by footpaths 11 ft. wide are carried on the high level floor inside the posts and diagonals. The lower floor carries four tracks for street cars with the roadway for vehicles, 36 ft. wide, in the center. The street car tracks are to be laid on each side of the trusses, those on the outside being for the underground conduit system and the two inside tracks for overhead trolley cars. There is 15 ft. head room under the top floor and 16 ft. 6 in. headroom from the top floor to the cross braces.

The towers will all be of similar appearance. The legs are 93 ft. center to center on the piers, the tops of which are 14 ft. 9 in. below the floor level. From center to center of the top and bottom chords at the towers, is 185 ft. The two legs of the towers will be united at the top by an ornamental arch and cross braced with diagonals as shown on the elevation.

The specifications require the use of open hearth steel throughout and where nickel steel is used a minimum of 3.5 per cent. of nickel is required. In testing full sized eyebars, should any bar break in the head, two additional bars will be tested from the lot and if either breaks in the head the entire lot of bars covered by the test will be rejected. The nickel steel test specimens cut from the eyebars must have the following physical properties: Unannealed, 90,000 lbs. ultimate strength, 52,000 lbs. elastic limit, 18 per cent. elongation in 8 in. and 35 per cent. reduction of area. Annealed, 85,000 lbs. ultimate strength, 50,000 lbs. elastic limit, 20 per cent. elongation in 8 in. and 40 per cent. reduction of area. The annealed specimen not less than 4 in. wide must bend cold 180 deg. around a pin whose diameter is twice the thickness of the test piece. The unannealed specimen must bend cold 180 deg. about a pin whose diameter is three times the thickness of the test piece. The full sized bars unannealed have the same bending test as the test specimen. The full sized annealed bar must have an ultimate strength of 85,000 lbs., an elastic limit of 48,000 lbs., an elongation of 9 per cent. in 18 ft. and 40 per cent. reduction of area with a 90 deg. bending test cold allowed to cool in the furnace to 570 deg. for a time not exceeding 24 hours and not less than 12 hours.

The bridge has been designed to carry in addition to its own weight and that of the floor, a live load either concentrated or uniform, so placed as to give the greatest stress in each member of the structure. The assumed loads for the main members of the trusses and towers are 6,300 lbs. per lineal foot of bridge as "regular," or 12,600 lbs. per lineal foot of bridge as "congested" traffic. For the secondary members of the trusses, floor beams and floor system the loadings are as follows: On each elevated railroad track, a load of 52 tons on four axles, 6 ft. plus 10 ft. plus 6 ft. apart (the motor ends of two motor cars of the Interborough Rapid Transit Co.). On each street car track, either a load of 26 tons on two axles 10 ft. apart or a load of 1,800 lbs. per lineal foot of track. On any part of the roadway a load of 24 tons on two axles, 10 ft. apart and 5 ft. gage (assumed to occupy a space 12 ft. wide and 30 ft. long), and upon the remaining portion of the floor a load of 100 lbs. per sq. ft. On the foot walks, a load of 100 lbs. per sq. ft. The wind is assumed as a moving load acting in either direction, horizontally of 2,000 lbs. per sq. ft.

The illustrations have been reproduced from the plans sent out with the specifications and they show the general appearance and some of the principal details of construction. The whole design has been approved architecturally by the Municipal Art Commission and combines grace and beauty with utility and strength.



Section and Elevation at Towers.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Elsewhere in this issue the specifications for material and workmanship of Blackwell's Island bridge are given. They will be found of interest to our readers, as it is the first time nickel steel has been specified for bridge work. This material is called for in the eyebars and pins, but provision is also made for using structural steel in the eyebars and pins, should it be found desirable or expedient to do so. Nickel steel, with an elastic limit of 48,000 pounds per square inch, and an ultimate strength of 85,000 pounds per square inch, with nine per cent. elongation in 18 feet, and 40 per cent. reduction of area, is an ideal material for eyebars for large bridges, and its use should be carefully considered by all engineers. Some of the recent articles on the merits of wire cables versus eyebars have departed from the point at issue, and made it appear that all eyebars are unreliable and unsafe. The manufacture of steel eyebars for bridge purposes in this country is too important an industry to be maligned in this way, especially as there is little ground for many of the assertions that have been made. The steel eyebars of to-day are better than ever before. This is because greater care is being taken in the manufacture of the steel and in the tests made to determine its quality before its acceptance and forging of the heads. It has been found that as the thickness of the eyebars was increased, the bars gave trouble on full sized tests, breaking in the body, head or neck, with little elongation, slight reduction of area and often giving fracture with large coarse grain. This trouble is largely due to finishing the steel too hot in rolling, and cannot be detected by the old method of tension tests and small bending tests on pieces of bars that have been annealed, as was often called for in the older specifications. To-day tension tests are made on the bars as rolled, and the bending tests on bars of full thickness. Thick eyebars now made from material which have passed these bending and tension tests give very satisfactory results. The difficulty in making large eyebars increases with the increase of carbon, and it is here that nickel steel has its special advantages. Three and one-half per cent. of nickel increases the ultimate strength as much as fifteen points of carbon, with a greater increase in the elastic limit. The elongation and bending properties of the nickel steel are much superior to the carbon steel of the same tensile strength, and it can be forged with less danger of injury. From the specifications for the nickel steel eyebars for the new bridge it at once appears that full provisions have been made for bending tests on bars of full thickness, as well as bending and other tests to check the annealing of the bars. These specifications were drawn up and are based on the results of a large number of tests on nickel steel eyebars. They have not been formulated on guesses or the results of only one trial heat. Having seen the reports of the tests we are confident that the bars as specified can be produced commercially and at a reasonable cost.

No detail of the locomotive causes such expense and delay in service as the boiler. Much attention is given to the general design of the locomotive so that the boiler capacity shall bear the proper relation to the power of the cylinders, and the arrangement and construction of the several parts is considered with care so that the circulation of water shall be free and unobstructed. Yet all this may be of little avail if the engine receives improper treatment after being put in service; and frequently locomotives small in size and poorly designed give proportionately better results than larger and more modern machines. The reason for this can often be traced to the poor condition of the larger boiler; coated heating surface, bad leaks, etc., due to careless or ignorant treatment. The paper of Mr. M. E. Wells on the care of locomotive boilers, which appears elsewhere in this issue, merits the careful attention of those responsible for the expeditious movement of trains. The subject interests managers because the cost of operation is affected by inefficient motive power; it interests the superintendent of motive power for he is responsible for the efficiency of engines; it interests the master mechanic and the roundhouse foreman for it has to do with the cost of repairs; and it interests the engineman because the power and reliability of his engine depends upon a free steaming boiler. This paper also interests the operating department, for motive power in good condition means decreased delays and less liability of failure in service. Master mechanics and roundhouse foremen often point with pride to quick handling of engines at terminals. This, of course, is well and good, and every effort should be made to decrease the time that engines are out of service; but it is false economy to rush engines through terminals and "back shops" at the expense of proper treatment. An hour and a half for cooling down a locomotive may seem long, but if the desired results are to be obtained, the time must be taken. The character of the scale in a boiler is also affected by the rate of cooling, and this gives added interest to the question of time. Take two evaporating dishes, such as chemists use, and fill each with water containing scale-forming substances. Heat one over a hot flame and drive off the water rapidly. Allow the water in the other dish to evaporate slowly in a warm, dry place. On the first dish will be found a layer of hard baked scale, while in the other the scale can be removed by the finger nail. Somewhat similar conditions exist within the boiler of a locomotive. Or, in other words, rapid cooling drives the suspended scale to the shell and bakes it hard. Improper treatment of locomotive boilers is not altogether due to indifference or neglect, but is sometimes due to the demand of the operating department that every locomotive be kept in service as constantly as possible. Under such a condition the problem resolves itself into whether it is economy to get along with few engines hard driven, or to provide a larger number of engines to do the same amount of work. This is difficult to answer unless all factors can be considered, but there would appear to be a mean between many engines well cared for and few engines hard driven, which would give better results than are now usually obtained.

Two Collisions on Electric Railroads.

The collision at Burt, N. Y., July 4, reported on by the New York State Railroad Commission, as cited in another article (below) appears to be one more of those examples, which are numerous, of the results of an electric railroad, running trains or cars at high speeds, adopting standard railroad methods, but with dangerous modifications; such modifications as the officers' horse-car habits seem to them to require. A conductor and motorman of ten years' experience started out without orders; and the Commissioners' report which, as given, we copy from a Buffalo paper, discloses no explanation. Apparently such practice is not uncommon on electric lines. The degree of safety to be expected from electric railroad management is indicated by the statement, quoted in the report, that the reason why telegraphic train orders cannot be repeated, and re-read, and otherwise safeguarded is that trains are too frequent! Most people would say that the greater the number of trains the greater the need of the most complete safeguards.

The Commissioners themselves seem to have anything but precise ideas about the discipline necessary to run trains in safety by the American despatching system, so called. To merely "censure" an operator for not knowing to whom he delivers an order is a queer kind of discipline. This operator had been railroading twenty-four years.

The other most prominent collision, in the record published to-day, appears to have been due to the now familiar trick of "stealing a switch." The fundamental fault is exactly the same in this case as in the other, the running of cars at high speeds by regulations which are safe only at low speeds. The remedy, of course, is plain. By adopting standard railroad methods, the electric cars can be run as safely as steam railroad trains. It is necessary, however, to add to this that the standards of safety prevailing on the steam railroads of this country are, as a whole, by no means ideal. An electric road which satisfies itself and tries to satisfy the public with the complacent announcement that it "has adopted steam road methods" has not accomplished much unless it has adopted the *best* methods.

Some steam railroads appear to make fair records without using block signals. The methods of those roads should prove satisfactory on an electric railroad doing a similar traffic, if care is taken to include all the details which go to make up the "methods;" which include the methods of selecting, training and promoting the men, and the classification of the trains. But if 25 per cent. of the trains on a single track road without block signals are extras, the problem of running them is quite different from that where only 5 per cent. or 2 per cent. are extras.

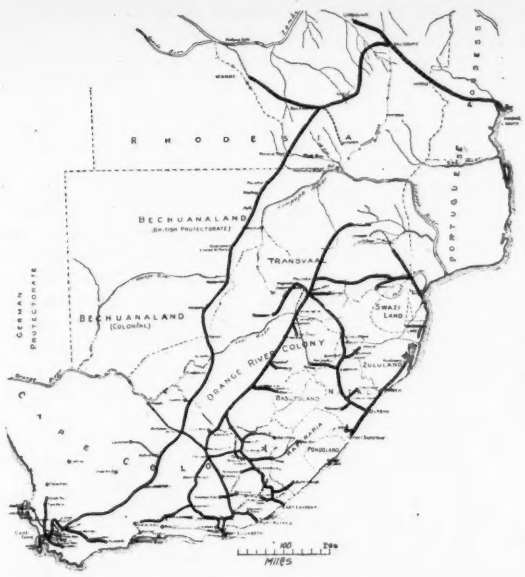
Not all steam roads are able to make creditable records without block signals. The electric road which adopts the methods of a steam road on which disastrous collisions occur every few months takes the responsibility of showing that those methods are proper and adequate. At all events it ought to take such responsibility.

Whatever the shortcomings of the steam railroads, however, it is to be observed that on those sections of their lines where passenger trains are fast and frequent they have very generally adopted block signals. In the matter of frequency, electric roads, as a rule, go far beyond the usual steam railroad practice. If, with frequent trains, they are also to run the trains at the highest practicable speed, their duty in the matter of safeguards against collisions would seem to be to begin where the steam roads leave off. Instead of omitting the repetition and acknowledging of telegraphic orders, the need is for a system which is better than the most thoroughly protected orders—the block system. One sagacious and far-seeing American railroad superintendent said, about 20 years ago, that to run trains on our principal railroads without the safeguard of the space interval was a crime. A very few others held about the same opinion, though they did not express it in quite so radical a phrase. Since that time the hopes of those who have lived in the expectation that they could carry passengers in safety without the block system have rested on a fluctuating basis. In dull times, when railroad facilities everywhere were free from abnormal strain, and poorly trained conductors, enginemen and flagmen were rarely entrusted with delicate responsibilities, the passenger death lists were greatly reduced; but with the return of the conditions which attend a period of active growth in traffic we have again the long lists of fatalities which were so familiar in earlier years; and we still have before us the challenge to either admit or disprove the statement of 1883.

Cape Colony Railroads.

Following the declaration of peace and the resumption of traffic through South Africa, the Government railroads show in their annual report for the last calendar year large gains in both passenger and freight traffic, although some of the gains, caused primarily by the return of settlers, are doubtless abnormal. The lines have been greatly crowded with passengers so that the rolling stock has been insufficient to meet the demands and it has been impossible to offer inducements to the public to travel during the holiday period, in spite of the hardship occasioned to those living in the up-country towns, such as Kimberly, and accustomed to making summer trips to the shore. This refers rather to special long haul traffic than to local excursion traffic, however, Kimberly being nearly as far from the coast at Cape Town as Chicago is from New York. But it is thought that if the labor difficulty in the Transvaal can be satisfactorily settled, there will be a sufficient development in mining to keep the through traffic at or above its present level for some years to come.

The total mileage of the Government lines in Cape Colony for 1902 was 2,318, as against 2,135 in 1901, four extensions having been opened during the year. Gross



Cape Government Railways.

earnings from all lines were £5,291,627, comparing with £3,852,871 in 1901, an increase of £1,438,756. It will be seen, therefore, that the lines earned about £2,281 per mile gross, as against £1,804 in 1901 and £668 four years ago. Considering the thinly populated territory through which many of the lines pass, this showing is excellent. By way of comparing traffic density with that of another British colonial railroad system, it is interesting to note that the Government railroads of India earned about £722 per mile of line during 1902, while those of the Cape were earning £2,281. The comparison is in many respects unfair to India, but serves to show how considerable a traffic has been built up at the Cape of Good Hope.

The capital cost of the Cape Railways at the close of 1902 is given as £24,031,778, as against £22,469,389 at the close of 1901. This gives a slightly lower capital cost per mile for the current year than for the year previous. The total interest charges on capital expenditure, assuming the treasury rate at 3¾ per cent., amount to £868,278.

Working expenses were £3,779,256 during the year, as against £2,875,571 in 1901, leaving a credit balance of £1,512,371, subject to fixed charges. The balance available after payment of these charges was £644,093, as against £147,581 in 1901. Included in working expenses is a charge of £584,721 for maintenance of way and buildings, which comes to about $1,292 a mile, reduced to American currency. In addition, £531,761 was spent for new works, track improvement, additional rolling stock, etc., and was charged to revenue—an extremely creditable showing.

In company with the experience of American managers, comment is made on the fact that there has been a general increase in wages along all lines, which has tended to bring up working expenses. Damage occasioned by wet weather, owing to an insufficient supply of tarpaulins with which to cover freight loaded on the prevailing type of open car, is an item not paralleled in this country, however; it cost the Cape Government Railways over $21,000 in the year under review. The supply of cars, both passenger and freight, was quite insufficient to handle traffic during the year, but the management hesitates to undertake to supply the demand at once owing to the likelihood that much of the present traffic may be temporary in its nature. A gondola car of 70,000 lbs. capacity has been approved and 50 of these are to be ordered at once.

The Cape Railways are divided into three systems, known as the Western, the Midland, and Eastern, exclusive of the lines in Rhodesia, Natal, etc., with which connections are made. On these three systems there are now 469 locomotives in service, and the comments on the varying results obtained with locomotives of English and of American manufacture are interesting. Ten eight-coupled locomotives, with four-wheeled pilot trucks, built by Neilson, Reid & Co., from designs furnished from the Cape, are working on the Western system, three on the Midland and nine on the Eastern. They are reported as giving satisfaction. These lines are narrow gage (3 ft. 6 in.) and the engines are thought to give about the maximum in power obtainable for that gage, with a narrow fire-box placed between the wheels, since a longer box cannot be properly fired. There are also seven eight-coupled consolidation Schenectady engines on the Western system and seven on the Midland. They are equipped with two-wheeled pilot trucks. The Chief Locomotive Superintendent reports that their work is, in some respects, rough, and that they were troublesome to erect; but that taking all things into consideration, they are good engines. With the exception of the difference in the leading trucks and in the fixed wheel base they are similar to the Scotch locomotives, and, considering that the boiler is 5 ft. in diameter and the height of the boiler center above the rails is one inch more than double the gage, both types are reported as running with remarkable steadiness, even at high speed. One eight-coupled tandem compound, built by the Schenectady works, is also in use on the line and is reported on favorably, although the locomotive superintendent wishes a longer experience with it before he compares it with the simple locomotives in service.

The accompanying map, though of necessity greatly reduced, will serve to give an idea of the territory reached by the Cape Railways, from Cape Town, on the south, connecting through to points in Rhodesia, on the north, and Pungwe Mouth and Delagoa Bay, on the east.

July Accidents.

The condensed record of the principal train accidents which occurred in the United States in the month of July, published in this issue, contains accounts of 38 collisions, 26 derailments, and 7 other accidents. Those which were most serious, or which are of special interest by reason of their causes or attending circumstances occurred as follows:

		Killed.	Injured.
7th.	Rockfish, Va.	23	6
10th.	Madison, Ill.	2	3
12th.	Lee's Summit, Mo.	2	40
13th.	Prescott, Ark.	0	2
16th.	Shelbyville, Ill.	1	6
18th.	Starlight, Pa.	1	1
25th.	Hutchinson, Kan.	2	14
26th.	Vlasaty, Minn.	4	25

The 23 deaths in the Rockfish disaster are to be charged to a cause which has figured in prominent accidents in each one of the last three monthly records, April, May and June; Buffalo, Kansas, in April; McKeever, N. Y., in May; Stilwell, Kan., and Raymond, Iowa, in June. In each case a conductor and an engineman appear to have read a telegraphic order, dealing with matters of life and death, with the same degree of care that is usually exercised in reading department-store checks for 30-cent purchases of dry goods. Errors in giving or receiving or delivering or reading train orders are no new thing; they occur every month; but these four collisions killed 33 persons; and Rockfish increases this number to 56. How often must there be a repetition of death-lists aggregating three-score, in order to secure the abolition of this dangerous element in train management?

The number of electric railroad accidents and of casualties resulting therefrom is unusually large this month; 34 accidents, 12 persons killed and 269 injured, of whom 12 are classed as fatally injured. The butting collisions at Burt, N. Y., on the fourth, and at Westboro, Mass., on the 25th, account for 148 of the injured; and in these cases the reports include, perhaps, a larger proportion of the slightly injured than is generally reported; but the record is bad enough at best. Among the other cases are three due to failures of brake chains or other brake apparatus; and a derailment of a work train, killing two persons, due to a misplaced switch.

The collision at Burt, N. Y., was investigated and reported on by the New York State Railroad Commissioners, and their report says:

"Electrical Expert Barnes has made a very thorough investigation of the methods of operation, condition of the cars as shown by the shop records just previous to the accident; he inspected the brakes, finding that the proper sand boxes were provided and filled; examined the condition of the tracks and investigated the records of the conductor and motorman of car 700.

"He finds that neither of the motormen tried to use sand at the time of the accident. He finds that the motorman and conductor of car 700, the open car, who have been indicted by the criminal authorities of Niagara County, were familiar with the rules of the company. . . . The accident was the result of the crew of car No. 700, which was traveling as the first section of train No. 60, leaving Olcott Beach, carrying a 'car-following' sign, without running orders. The operator at Olcott Beach should be censured for the careless manner in which he handled the train orders, he not being able to state to whom he gave orders for the first section of train 60.

"Bullock, the motorman, had been in the employ of the International Railway Company and its predecessors as motorman for 10 years. He had been disciplined once for running past a switch when he should have waited for another car.

"Clancey, the conductor, had been in the employ of the International Railway Company and its predecessors as motorman and conductor for 10 years.

"Wadsworth, the operator at Olcott, had been in the employ of this company for two years and six months. Previously he was agent and operator of the New York Central at Wilson for 24 years. His record since his employment by this company has been first class.

"The International Railway Company does not use 'Form 31,' as it is called. Operating officers of high speed electric railroads claim that it is impracticable to use form 31 on their lines, the reason given being the frequency of service and the delay caused in the handling of train orders on form 31.

"The Commissioners recommend:

"First.—That Mills street in Lockport and Olcott Beach be made register stations.

"Second.—That the switch targets on the Buffalo & Olcott line, view of which is now obstructed by poles, be placed so that good view of them can be had from approaching cars, and that the targets be repainted."

This case, and the collision at Westboro, Mass., are briefly discussed under another head.

The Pennsylvania Railroad has ordered 50,000 young locust trees, which are to be set out this fall, on land owned by the company; and it is the intention that the policy thus begun, of raising timber for the use of the road, will be continued by the planting of additional trees each year hereafter. Some experimental work has been done along the Middle division of the road for two years past, and several thousand trees are already in flourishing condition. The company owns a large number of tracts of land at various points along its lines, where, in purchasing rights of way, it has been necessary to buy more land than was needed for the tracks. Some of the farms thus bought have been leased and are now occupied by tenants; but in many cases where the soil is suitable for the cultivation of the locust, it is the intention of the company to terminate the leases which are now in force. While locust is not the best wood for ties and while so extensive an establishment as the Pennsylvania Railroad will need large quantities of this timber for posts and other uses, still the need of a large supply of ties and the increasing difficulty in getting good ties at reasonable prices has been, we understand, a principal factor in determining the company to enter upon this extensive forestry work. True to its habitual recognition of the ideal and the human as well as the practical and cold sides of things, the Pennsylvania does not go to a desert or a mountain, but plants its trees where they may benefit its neighbors, the farmers.

NEW PUBLICATIONS.

The World's Commerce and American Industries. Published by the Philadelphia Commercial Museum, Philadelphia, Pa., 1903. Prepared by John J. Macfarlane, Librarian. Graphically illustrated by 86 charts. 114 pages 7½ x 4, bound in paper. Price 50 cents.

This unique pamphlet is designed to illustrate, graphically, the progress and present condition of the commerce of the world, of the manufacturing industries of the United States, and of British and American shipping. The commerce of different countries is shown on disks, subdivided into sections proportionate to the respective commerce of the nations involved, and the leading manufactures of the United States are shown in the same way, classified according to the principal place where they are made, and also according to the countries which receive them as imports. The pamphlet gives a clear idea of the information it is designed to convey, and makes a valuable and convenient statistical hand-book. In the use of the subdivided disk, the author has hit upon a very successful method of comparative analysis, more graphic perhaps than any other method now used for a like purpose. It would take quite a good sized library of statistical volumes, and much research, to reproduce the information contained in this little pamphlet.

TRADE CATALOGUES.

Pratt & Whitney Co., Hartford, Conn., has sent out a handsome new edition of its catalogue No. 2, of small tools, taps and dies, reamers, milling cutters, punches, standard gages and measuring machines. This company has long been the maker of the standard gages for the railroad mechanical associations and all of these are shown in this catalogue together with many other forms of thread and screw gages. A complete line of tool room specialties is also described. The book is illustrated with many half-tone engravings and contains besides an excellent index, and a number of tables of sizes, standards and equivalents.

Rotary File & Machine Co., Brooklyn, which makes a specialty of filing machinery for all purposes, has issued a catalogue in which are described three forms of automatic filing and setting machines for band, circular and hand saws. These machines may be mounted on a bench or pedestal and are designed to accurately set and file saws by power and do away with laborious and inefficient hand work. A beveled rotary file is used and the saw is automatically moved under the file by a cam attachment on the rotating file arbor.

Boston Belting Co., Boston, maker of nearly every form of rubber specialty, has published a small catalogue of rubber mats and matting and step treads. These goods are made in the designs shown in this catalogue or in special designs to order. Car step treads in a variety of shapes and designs are illustrated, with price lists.

Westinghouse Electric & Manufacturing Co., Pittsburg, has issued circular No. 1,067 describing the type of air blast transformer which it makes. The constructive features and the operation of these machines are fully described. They range in size from 100 k.w. to 3,000 k.w., and are suitable for any voltage up to 33,000.

The Durand Collision.

The State Railroad Commissioner of Michigan has received from the Grand Trunk Railway a report of the disastrous collision at Durand on Aug. 7, in which 21 circus employees and two railroad men were killed and over 30 persons were injured. In a rear collision, due to failure to control speed, a sleeping car and a caboose were completely wrecked; and it was the occupants of these two cars who were the victims. The report says that so far as can be determined by the investigation, "it is thought that the engineer of the second section instead of placing the engineer's valve in running position, after stopping at Lansing, placed it on lap, thus shutting off the flow of air from the main reservoir to the train line. All appliances were found to be in good condition." The collision occurred at about 4 o'clock in the morning. The first circus train was stopped at the entrance to the yard, and was run into at the rear by the second circus train. A flagman was sent back from the foremost train, but his signals were ineffectual.

The Inspection of Rails.

BY C. W. GENNET, JR.

The characteristic attribute of the good rail inspector is his ability to distinguish between what manufacturers term "mill practice" and the various clauses of specifications which, broad or narrow as they may be, are the basis of protection for the purchaser. The expression, mill practice, is the maker's safety valve, his loop hole on which he bases his argument for acceptance when technically the article is subject to rejection. In no phase of an inspector's work is he brought more into contact with mill practice than in the inspection of rails. The point is conceded that with heavy work of this nature it is impracticable if not impossible to work to exact dimensions. Inability to regulate accurately and constantly the heavy machinery of the rolls, the different temperatures of the steel used, and the seeming impossibility of accuracy of adjustment in the finishing mill, are features which contribute toward the irregularity of the output. Any variation from the dimensions laid down, however great or insignificant, will be charged to mill practice because of the allowances granted by the invention of that expression. The inspector is required to decide whether these variations are sufficient to cause trouble to the track layers or are such as to operate against the conditions of a perfect track. With this in view it will be found important that he be familiar to some extent with the devices and methods employed in track laying and with the difficulties experienced, in order that the latter be guarded against and as little complaint as possible ensue.

The inspector's duties in the rail mill strictly begin at the rolls. While it is true that he should possess a keen knowledge of the practice employed in the making and treating of the steel up to that point, still the condition of these operations rightly devolves upon the manufacturer, who is always held in check by the requirements of the specifications governing the chemical analysis. It will be found advantageous to cut short sections of the rail every hour, at the hot saws, and the inspector should carefully gage these sections, by comparison with the standard templates. Possibility of overlooking an important variation is thus largely avoided, and the maker is saved the liability of having several hundred tons of rail piled up before the matter could be otherwise noticed in the finishing mill. These sections should be allowed to cool naturally and if, during the night, they are marked with the hour at which taken, and kept for the inspector until morning, it will be found that matters are facilitated to a large extent. In measuring the sections or comparing them with standard templates, it must be remembered that the vital point is a good splice bar fit. It is the tendency for the splice bar fit to become larger as the rolls wear. This allows the splice bar to set in farther. The angles of the top of the flange and base of the head are generally such as to always keep the axis of the hole punched in the splice bar on a line through the apex of these angles parallel to the base of the rail, and so it would seem that a loose splice bar fit would cause no trouble. But it should be remembered that in drilling rails the base of the flange is taken for the basis and the height of the holes drilled above this base has to be maintained regardless of the section. With a loose splice bar fit this creates a tendency for the holes in the splice bar to be out of line with the holes drilled in the rail; and the result, when carried to excess, will not allow the track bolts to go through. On the other hand, a tight fit may work in exactly the same manner, and at the same time make the overall dimension through the splice bars and rail such that the bolt will be too short and the nuts will not screw on entirely. Most specifications permit a maximum variation in the height of the rails of $^{3}/_{64}$ of an inch. Insignificant as this may seem it cannot fail to be noticed on the track should abutting rails vary to this extent; and to eliminate the opportunity for this condition, which will not make a smooth track, the height should be maintained as nearly constant as possible. One prominent mill finds trouble in keeping up the fillets under the head of the rails and another in keeping up a good head and flange on certain sections. But they must get the weight in somewhere, and that it does not come at an undesirable place is for the inspector to detect. A smooth finish to the rail is necessary to give a good finished appearance and when any roughness occurs, bad fillets, or anything about the section which is incapable of being regulated, it should be insisted that the rolls be promptly changed. Occasionally the rails should be weighed on the hot beds, or else a close check taken from the weights as computed from the shipping lists. Specifications containing the clause controlling shrinkage are now frequently seen. This requires that the distance between the saws be measured up and the various rails later measured when cold.

An examination should be made of the rails on the hot bed occasionally. Here the general surface appearance can be seen at once as the rails come from the rolls, for, with a stick of wood to scrape off the scale as it forms, the whole surface becomes visible from the blazing stick. The sawing of the ends can be tried with a square and if found wrong its cause can be readily traced. The required square sawing is frequently overlooked, but the importance of it becomes apparent when the joint allows but one-eighth of an inch between the rail ends. It is obvious then that a variation of half that amount, due perhaps to a skew in one of the saws, is extremely undesirable. It is a well known fact that rails which when cold and before being straightened contain an over or under camber of as much as three or four inches in a length of 33 ft., are almost impossible to get absolutely free from kinks even in going through the straightening presses. That the effect of numerous blows, each straining a part of the rail beyond its elastic limit as in cold straightening, is not detrimental to its life and quality, is not proven. Aiming towards the successful regulation of this feature and with a view of getting the rails as nearly straight as possible after passing through the period of recalescence on the hot beds has led to the adoption of the curving or cambering machine. To derive the element of good for which it is intended, this machine needs constant attention, because of the differing temperature of the rails; and unless this feature is carefully guarded its use becomes of little value, and is attended with evident dissatisfaction to the purchaser of the rails.

Passing to the finishing mill, the inspector has dimensions and templates for following the drilling of the rails. Accuracy is essential here and practically no variation is permissible. Correct drilling can be done, and carelessness or negligence are the only excuse for bad drilling. The work is generally in charge of a mill inspector, who also handles the matter of correct rail lengths. It is best checked up by going over numerous rails, perhaps with the mill inspector, several times a day, trying the drilling gages and measuring the lengths, and persistently insisting on close accuracy for both.

It should be required that the heat numbers be plainly stamped on the rail in several places, the figures always being made distinct so as to be able to be read by one unfamiliar with the subject. It would seem that this is quite as important as having the makers name on, but the results obtained are seldom seen in anything like the same degree. The effects of cold straightening, before mentioned, come into evidence here. Gag marks on any part of the rails are undesirable, perhaps particularly when on the head. An employee of a mill recently examined a rail broken in service and his acknowledgment to the writer that he was able to detect with his finger the marks of a gag at the point of fracture is an example of the hazardous possibilities that result from cold straightening. On the loading piles the rails should be carefully sighted, preferably from both ends, to insure against crooks. It should be noted that on rails which bear a slight sweep either up or down or sideways, this can possibly be succesfully overcome when laying the track. It is the rails which drop on the ends, the short crooks and the succession of waves that make the uneven troublesome track. Most users prefer rails to be slightly under cambered and then in the cold straightening presses to be brought up to a straight condition by gagging on the flange. Rails which have a kink in the extreme forward end should be carefully watched for. This kink, sometimes resulting from an action at the rolls, but more often from the rail hitting hard on some stop while it is hot, is quite impossible to take out because of the proximity to the end.

Lastly, the rails should be surfaced for the ordinary defects such as slivers, seams, pipes, scabs, or flaws of any kind. Such rails and only such should constitute the second quality class, for any mechanical defects which result from defective workmanship, will be quite as likely to cause trouble if used for seconds as if used for first quality rails. To best accomplish the surfacing, rails should be gone over on both heads and flanges, for serious flaws occurring in the latter may be entirely overlooked if only the heads are surfaced as is common.

Specifications which require bending tests on small hammered pieces from each heat, are practically obsolete. However, this bending test is easily made and is a fair estimate of the steel in lieu of any other tests. Drop tests are a far better method of determining the quality, are easily made, and quickly confirm the condition of the steel after it is rolled. It is undesirable, though customary, to use crop ends to make the tests on; and unfortunately, perhaps, there does not seem to be much effort made to get these test pieces from the same position with respect to successive heats. If crop ends are used for original tests and one fails, it would seem consistent to use crop ends for retests, but this is seldom done and it would consequently appear to be as fair to the purchaser if regularly cut lengths were used for the original tests. The inspector should see that the pieces tested are not too warm to influence the results and on the other hand too cold in the winter time to be brittle. Pieces that have been in contact with water during the period of cooling are generally considered as unavailable for making drop tests on, though a hard rain which thoroughly drenches rails cooling on a hot bed is said to cause no ill effects. All details of the drop tests should be carefully noticed and in cases of failure, assurance made that the retests represent the correct heat.

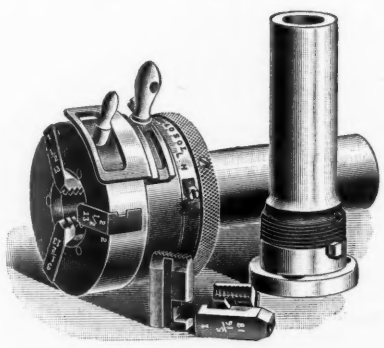
The rail inspector will find it extremely desirable at all times to consult the mill people on such questions as arise and give any cause for variance of opinion. Co-operation with the makers is very essential in the manufacture and inspection of rails; and questions handled in an arbitrary manner, or differences based on trivial technicalities without taking into account the subject of mill practice cannot result for the best mutual satisfaction.

The new stone bridge of the Pennsylvania Railroad over the Delaware River between Trenton, N. J., and Morrisville, Pa., has been opened for eastbound traffic. This bridge is 1,080 ft. long, has 18 arches and is to have four tracks. It shortens and straightens the main line of the New York Division.

A New Design of Opening Die.

An improved design of opening die for turret lathe work, is shown in the accompanying engraving. It is so arranged that the chasers are positively opened by the rotating stock. Also the operator may take two or more cuts if desired in finishing the thread, the depth of the roughing and finishing cuts being easily regulated to suit the diameter and nature of the work, while the size of the finished piece may be varied. The shank is detachable, enabling the head to be used in different sizes of turrets by changing shanks. The engraving shows one of these shanks, the chasers and an assembled die.

The die is made up of the head containing the chasers; a cam immediately back of the head which engages the slots milled in the backs of the chasers and regulates the depth of cut; a ring directly back of the cam, keyed to the shank and containing a slot which a pin in the cam



Assembled Die, Shank and Chasers.

enters, limiting the movement of the cam, the movement being further regulated by means of the two stop screws seen on either side of the graduations; and a knurled, threaded collar back of the ring, screwed onto the threaded part of the shank.

The head is kept from rotating, while the work is being fed into it, by means of three pins driven into its back which enter corresponding bushings in the shank. When the turret slide reaches the end of its travel the head draws away from the shank far enough to disengage the three pins from the bushings. Then the chasers being still in the thread, the rotating stock turns the head and chasers and the cam remaining stationary opens the die, which may then be drawn away from the threaded piece. To close the die, the head is pressed back and turned slightly, till the driving pins enter their bushings.

The depth of the cut is varied by turning the cam on the shank. To facilitate setting the cam the graduations are provided on the ring directly back of it, a zero line being scribed on the cam and a handle screwed into it to move it. The stop-screws in the ring enable the cam to be positioned for roughing and finishing cuts.

The distance the die may be opened for withdrawal from the work is regulated by the curved, slotted plate on top. This plate is clamped fast to the cam by the cam-regulating handle. The slot at the front with the pin passing through it and screwed into the head prevents the chasers from being opened further than is required.

The die may be used on an automatic screw machine, closure being effected by a finger attached to the back of the turret slide, which, as the turret rotates, presses against a pin in the die-head, causing the latter to turn till its driving-pins are in register with the bushings and forcing it back into position.

The die is being put on the market by the American Machinery & Export Co., 118 Liberty street, New York.

TECHNICAL.

Manufacturing and Business.

The Westinghouse Electric & Manufacturing Company has a contract from the Peterborough Hydraulic Power Company of Canada, to build a plant on the Otonabee River.

The National Drill & Machine Company of Barberton, Ohio, is preparing plans to build additions to its shops to make drill machinery, contractors' tools and grading machinery.

The Burns Iron Company has been incorporated in New Jersey, with a capital of $450,000. Richard F. Tully, Wm. C. Sherwood and T. W. B. Middleton, of Jersey City, are incorporators.

The International Air-Brake & Steam Construction Company of Newark, has been incorporated in New Jersey, with a capital of $5,000,000. Horace H. Dall, B. Painton and James Neil, Jr., are incorporators.

The Goyne Steam Pump Company, of Ashland, Pa., has been incorporated, with a capital of $10,000, to make pumps and general machinery. C. A. Goyne, F. H. Goyne, J. R. Goyne and A. H. Goyne are directors.

The Miller Machine Company, of Norwalk, Ohio, has been incorporated, with a capital stock of $20,000, to make telephone and telegraph supplies. Geo. H. Miller.

James B. Miller, H. F. Jackson and Arthur E. Rowley, all of Norwalk, are interested.

The Celoron Steel Plant has been incorporated in New York, to make steel road scrapers, and build bridges, with a capital of $50,000. Ziba L. Squire, Asa L. Mosher, of Celoron, N. Y., and Jerome M. Hobart, Panama, N. Y., are incorporators.

The Washburn Company, of Minneapolis, Minn., has been incorporated with a capital of $200,000, to make the Washburn car coupler and other railroad supplies. W. D. Washburn, Edwin C. Washburn, C. C. Crane, F. M. Crosby and John B. VanDerlip are incorporators.

The West Allis Malleable Iron & Chain Belt Company of West Allis, Wis., is increasing its facilities to accommodate the growing business. It will have a new foundry 208 ft. long. The capital stock has been increased to $150,000.

Messrs. Boller & Hodge, 1 Nassau Street, New York, have been appointed the engineers in the place of Geo. S. Morison, deceased, to draw up the plans for the Detroit River bridge. The Michigan Central and the Grand Trunk railroads are both interested in this bridge.

The Burrell Construction Company has been incorporated in California, for the purpose to build bridges and other structures, with a capital of $250,000. The stockholders are Alfred W. Burrell, A. Rey Burrell, Irving H. Burrell, James R. Kenna and Geo. C. Davis. The headquarters of the company will be at Oakland.

At a meeting of the creditors of the Columbia Iron Works at St. Clair, Mich., a proposition was made to form a new company, with a capital of $300,000, to be apportioned as follows: $225,000 to creditors in payment of claims; $50,000 to the present stockholders; $11,000 to the preferred stockholders, and $14,000 to be held for sale.

Mr. Broderick Haskell has resigned as Superintendent of Motive Power of the Pere Marquette, and accepted the position of General Manager of the Franklin Rolling Mill & Foundry Company, of Franklin, Pa. Mr. Haskell has served on the Kansas Pacific, the Northern Pacific, the Chicago & West Michigan and the Detroit, Lansing & Northern. In 1900, he was appointed Superintendent of Motive Power of the Pere Marquette, where he remained until now.

The Ingersoll-Sergeant Drill Company, which has recently put on the market a line of pneumatic tools, reports an excellent showing of the Haeseler "Axial Valve" hammers, in comparative tests with other similar tools. Among the latest purchasers of these tools are: Niles-Bement-Pond Company; Ramapo Iron Works; MacPherson Switch & Frog Company; Creswell & Waters Company; Warren Foundry & Machine Works; Chicago, Rock Island & Pacific R. R.; Brown Hoisting & Conveying Machine Company; Howard Iron Works; International Boiler Works Company.

Iron and Steel.

The Wheeling Steel & Iron Company, of Wheeling, W. Va., is considering a plan to build a large plant on the site of the old furnace in Marine Ferry.

The Jones & Laughlins Steel Company, at its Eliza blast furnace in Pittsburg, is to add 500 beehive coke ovens. This will give this company a total of 1,900 coke ovens.

Mr. James Ross has resigned as President and Director of the Dominion Iron & Steel Company. He is, however, still on the Board of Directors of the Dominion Coal Company.

The Black Diamond Mfg. Co., Monongahela City, Pa., has been chartered with a capital of $15,000, to make iron and steel. T. R. Campbell, M. F. Allen and T. M. Bogga are directors.

The Harrisburg Pipe & Pipe Bending Works at Harrisburg, Pa., recently made the first steel ever made in Harrisburg. Three basic furnaces of 40 tons capacity each will shortly be included in the equipment.

Contracts have been signed by the Baltimore & Ohio Railroad Co. for 50,000 tons of 85-lb. steel rails for 1904 delivery. The Carnegie Co. will furnish 28,000 tons, Cambria 12,000 tons, and the Maryland Steel Company 10,000 tons. The latter will be made at Sparrows Point.

The Pennsylvania Steel Co., Steelton, Pa., will rebuild its No. 3 furnace. When completed, the stack will have a capacity of 400 tons a day. There are five furnaces in operation at present, turning out 1,000 tons of metal daily. This is the greatest amount ever produced by this company.

The Republic Iron & Steel Company, Youngstown, Ohio, has resumed work at its Bessemer plant, which has been idle about three weeks. During this time the blooming mill has been rebuilt and its capacity increased from 800 to 1,800 tons, and the converters changed from five to ten tons capacity. A new engine has also been installed.

The following officers and directors have been elected by the Knoxville Iron Company, Knoxville, Tenn.: W. P. Chamberlin, President; T. I. Stephenson, Vice-President and General Manager; Otis A. Brown, Secretary and Treasurer; H. S. Chamberlain, David Richards, W. S. Mead, W. H. Vanvenschoten and E. T. Sanford, directors.

Capitalists of Toronto and Montreal are reported to have secured the Ruthenburg process of making steel by electricity and are about to build mammoth electrolytic steel works on the Welland River at Chippewa, where they have already secured a site. Power for generating the necessary electric energy will be conveyed from Niagara Falls.

The United States Sheet & Tin Plate Company, recently organized with a capital of $1,000,000, represents many of the independent rivals of the United States Steel Corporation. Its plants and steel mills, and other properties, principally in Ohio, include those of the Marietta Sheet & Tin Plate Company, Marietta, Ohio; the American Tin & Terne Plate Company, of Philadelphia; the Tuscora Steel Company, with sheet rolling mill and galvanizing plant at Newcomerstown, Ohio; the Cambridge-Byesville Steel Company, now building an open-hearth steel plant, with blooming and billet mills, at Byesville, Ohio, and the Tucker Steel Roofing Company, Newark, Ohio. The company, it is said, also owns natural gas properties at Marietta and Byesville, as well as valuable coal lands. M. F. Strauss is President; J. R. Jackson, Vice-President; Larkin C. Taylor, Secretary, and H. C. Strauss, Treasurer and General Manager. Other directors are H. B. Stewart, C. L. Bailey, J. S. Black and W. H. Davis. M. F. Strauss and H. C. Strauss are officers of the American Tin & Terne Plate Company; J. R. Jackson, of the Jackson Rolling Mill Company, of Easton, Pa.; Larkin C. Taylor, of the Marietta Sheet & Tin Plate Company, and W. H. Davis, of the Wills Creek Coal Company. The annual output of the new company will probably be 40,000 to 50,000 tons of billets, sheet, and tin plate bars and structural steel, and 30,000 tons of black sheets, plate and galvanized iron. The coal fields controlled by this combination produce 200,000 tons yearly, one-half of which will be used and the balance marketed. The offices of the company will be at Pittsburg, Pa., and Columbus, Ohio.

The Consolidation Coal Co. Asks for Proposals.

The Consolidation Coal Co. asks for proposals for driving a drainage tunnel on its property through the measures underlying the Pittsburg bed. The tunnel will be about 11,000 ft. long, 7 ft. high and 8 ft. wide. Maps, profiles and specifications can be seen at the company's office, Frostburg, Md. Proposals will be received until Sept. 10.

Interlocking.

The New York Central is preparing to put in power interlocking at two towers at East Rochester, N. Y., No. 25 and No. 25A.; and also at two towers at East Buffalo, N. Y., No. 47 and No. 47A. Chief Engineer Fernstrom has asked for bids for the construction and installation of these interlockings and gives bidders opportunity to offer either pneumatic, electro-pneumatic or all-electric apparatus.

Tests of Falls Hollow Staybolt Co.'s Iron.

Some tests of Falls hollow and solid staybolt iron were recently made at McGill University, Montreal, Canada. One of these was a vibrating test, made at the request of the Grand Trunk Ry., approximating to the strains imposed in a boiler, but much severer. Specimens of Falls hollow and solid iron, each 1 in. in diameter, and of four other brands were tested. The hollow and solid specimens broke at 5,024 and 4,192 vibrations respectively. The other specimens ranged from 3,340 to 2,400. The vibrations were applied at the rate of 32 a minute.

A tensile test of a Falls solid specimen 1 in. in diameter showed a yield point of 33,790 lbs., and an ultimate strength of 50,150 lbs. per sq. in. The elongation in 8 in. was 29.25 per cent., and the reduction in area 56.44 per cent. A hollow specimen, 1 in. outside diameter and $^{3}/_{16}$ in. inside, had its yield point at 27,520 lbs., and ultimate strength at 48,420 lbs. per sq. in. The elongation in 8 in. was 32.5 per cent., and the reduction in area 53.7 per cent.

New Electrical Equipment for the Industrial Works, Bay City, Mich.

The Industrial Works, Bay City, Mich., has added to its electrical equipment four Westinghouse generators and a number of induction motors. The generators comprise one 150 k.w., direct-current, 110 volt, multipolar; two 30 k.w., 110 volt, multipolar; and a 200 k.w., 220 volt, three-phase machine operating at 7,200 alternations. This combination gives a very flexible system. The alternating-current machine is used for power purposes entirely. The large direct-current generator is also used exclusively for power, furnishing current for cranes and transfer tables, and for testing crane motors. The two 30 k.w. machines are used for lighting. They may be run either in series or multiple, the latter being desirable when they are used for testing purposes on a 220 volt circuit.

All of the main circuits are controlled from the power house switchboard. The various shops contain distributing switchboards for both light and power, placing the small individual light and motor circuits under the control of the shop foremen.

The generators are belted to a jack-shaft driven by rope drive from a 400 h.p. tandem compound condensing Hamilton Corliss engine. A second engine, a 200 h.p. Allis-Corliss, is held as a reserve, and is also used for light loads. The jack-shaft, furnished by the Dodge Mfg. Co., Mishawaka, Ind., is arranged so that it may be driven simultaneously or independently from either end, it being possible to cut off either engine by a friction clutch. Each generator also has a friction clutch. The halves of the shaft may be run separately by removing a plate in a solid coupling at its middle.

English Railroad Notes.

In a recent attempt of the London, Brighton & South Coast Railway to break the London-to-Brighton record, the distance of 51 miles was covered in 48½ minutes. For 50 miles the time was 44¾ minutes, the extra time for the additional mile being required by slow speed at termini. The train contained five cars, the weight being about 140 long tons. The engine had 19 in. x 26 in. cylinders, 78-in. drivers, 1,700 sq. ft. of heating surface and carried 180 lbs. steam pressure. The weather conditions were unfavorable, there being wind and rain. Grades, the heaviest of which were 1 in. 264, were ascended at from 60 to 68 m.p.h., and on descents, one quarter of a mile was made at 90 m.p.h. The average speed was 63.09 m.p.h. The projected mono-rail electric system is to make this run in 40 minutes, and this record shows that the steam road will be a serious competitor.

The new 4-4-2 engines of the North Eastern are nearing completion and will be running next month. They have 20-in. x 28-in. cylinders, 80-in. coupled wheels, and very large boilers having 2,450 sq. ft. of heating surface and carrying 200 lbs. pressure. These engines will pull the trains of the East Coast route, which weigh from 300 to 350 tons and run at 50 m.p.h. and over.

The Great Western is just completing its first 2-8-0 engine. It will have 18-in. x 30-in. cylinders, 54-in. coupled wheels, and a large boiler with extended wagon top, Belpaire fire-box and 2,400 sq. ft. of heating surface. The company is also building some large tank engines with a leading bogie truck, 80-in. coupled wheels and a wagon-top boiler fitted with side tanks and water scoops. With the opening of its new direct South Wales line this road has been able to make a reduction of about one-half hour in the time of its southwest trains. The time of one train from Bristol to London, 117½ miles, is just two hours, and the run has been made in three minutes less than this.

The Great Northern has turned out a new type of tank engine, with eight wheels coupled, and a trailing truck. The coupled wheels are 55½ in. in diameter and the trailing wheels 43½ in. The cylinders are 20 in. x 26 in. The boiler has 1,458.4 sq. ft. of heating surface, a grate area of 24.5 sq. ft., and carries 175 lbs. pressure. The weight of the engine is 173,800 lbs., of which 145,200 lbs. is on drivers.

R. HOPE.

THE SCRAP HEAP.

Notes.

The new stock yards of the Pennsylvania at Herr's Island, near Pittsburg, are to be opened next month.

In Boston, August 17, the New York Central lost $50,000 worth of coal by an accidental fire in the Albany street pockets. A fire August 18, in the Great Northern shops at Quebec, resulted in the total loss of the buildings, with two passenger cars and eight box cars. Loss about $75,000. The roundhouse and machine shop of the Atchison, Topeka & Santa Fe in Beaumont, Texas, were destroyed by fire on the 24th inst. The loss is estimated at $100,000.

American and German Coal in France.

The English Consul at Havre reports the arrival of two cargoes of American anthracite at that port, measuring 4,000 tons and 2,200 tons respectively. Difficulty was found in disposing of the second cargo.

Compound Locomotives in France.

On Jan. 1, 1902, that is 10 years after the introduction of the first two compound express locomotives on the Northern Railway of France, the seven most important French roads had 1,128 compound locomotives in service, the classes being distributed as follows:

Four driving wheels not coupled, three cylinders	1	locomotive.
Four driving wheels not coupled, four cylinders	1	do.
Four coupled driving wheels, four cylinders	405	do.
Six coupled driving wheels, four cylinders	523	do.
Six coupled driving wheels, three cylinders	1	do.
Six coupled driving wheels, two cylinders	16	do.
Eight coupled driving wheels, four cylinders	181	do.

From a Saginaw Valley Lumberman.

It does seem as if there ought to be something to offset delays in transit. We have one car now consigned to Riverside, N. J., that left here on the 8th of June, over two months ago, and not at destination yet. It passed Pittsburg July 8 and that is the last we have been able to hear of it. A little while ago we had a car for some eastern point and the P. M. took 15 days to get it from here to Port Huron, and it was 75 days between Port Huron and St. Thomas. It was 103 days reaching destination in the east. Any number of our cars take from 30 to 50 days between here and New York points. The delay is mainly east of Niagara or the Pittsburg boundary, and we sometimes have them held up in Toledo. They will transfer cars and lose part of the goods and damage the rest, and yet we cannot collect a claim, for they always insist that every part of it was transferred in good order and produce statements of roustabouts

that did the work to prove it. We have just stood a loss of $123 on a car that has been transferred and yet we will not be able to collect one cent from the railroad. . . . In view of the continued oppression of the railroads and the unfair manner in which shippers have been treated of late I am becoming quite a socialist.—*American Lumberman.*

New Warships.

The armored cruiser "Pennsylvania" was launched from the yards of the Wm. Cramp Ship & Engine Building Co., at Philadelphia, on Aug. 22. The "Pennsylvania" is larger than any American warship now in commission, having a displacement of 14,000 tons. Her hull is of steel and wood, and she is to have Niclausse boilers and twin-screw, vertical triple-expansion engines to develop 25,000 I. H. P. The contract requires an average speed of 22 knots an hour for four consecutive hours. The contract price for the hull and machinery is $3,780,000. Sister ships of the "Pennsylvania" are the "California," now building at the Union Iron Works, San Francisco, and the "West Virginia," at the yards of the Newport News Shipbuilding & Dry Dock Co., at Newport News, Va.

Contracts with the Crescent Shipbuilding Co., of Elizabethport, N. J., for the construction of the protected cruiser "Chattanooga" and the torpedo boats "O'Brien" and "Nicholson" were last week cancelled by the Acting Secretary of the Navy, and the work on them will be finished at a Government yard—probably at the New York Navy Yard.

New Railroads in the Philippine Islands.

The War Department at Washington, in consultation with Governor Taft, is considering the possibility of securing the construction of about 600 miles of new railroads on the Island of Luzon, P. I. A line is projected from Manila to the northern end of Luzon; another to cross that line from east to west across the mountains, and still another from Manila to Batangas, on the south. A line from Dagupan along the coast to the northern end of the island is also under consideration. While the Philippine Government has not power to grant any lands, it can grant rights of way; and if it will guarantee the interest on the bonds for a time, this interest to become a lien on the property, it is believed that capital may be secured to build the lines proposed.

Mr. Paul Morton's Observations in Europe.

American railroads give the best service at the lowest rates of any in the world. I did not notice any improvement in accommodations or facilities on continental railroads over those offered the last time I was abroad five years ago. Passenger cars in Europe are small, especially the sleeping cars, and you are crowded as to space; and the cars are very light in construction, causing passengers to be badly shaken up.

The service you receive while traveling does not begin to compare with the Pullman service. A guard answers the place of conductor and porter, and one roller towel at the end of each car is supposed to accommodate all the passengers. The American people as now educated simply would not put up with the facilities that the continental travelers get on their "trains de luxe."

In many of the trains the only way you can get towels, soap and other toilet accommodations is by patronizing the nickel-in-the-slot machines. These machines are in the lavatories on the trains. In Germany for 20 pfennigs you will draw out of these machines a towel about the size and thickness of an ordinary piece of writing paper and a cake of soap about the size of an American dollar. The towel is intended to be thrown away after you use it.

The physical condition of the railroads in Europe is very good for the weight of the rolling stock they use, but they would have to be entirely rebuilt to use the heavy locomotives and cars that now prevail in America. In Austria I noticed a good many metal ties, which seemed to make a very satisfactory track.

The dining cars in Europe are not as good as those in America. At the eating stations the trains do not stop twenty minutes as they do in this country, and when they strike an eating station about mealtime there is a grand rush for lunch baskets. These baskets are already put up to suit one or more people. In each one of these baskets there are a few boiled eggs, sandwiches, cake, bottle of cheap wine, etc. The prices, however, are very reasonable.

As to speed of trains in Europe, it is about the same as ours here, although a friend of mine, H. H. Vreeland, of New York, said he had traveled 700 miles on the "Oriental express" at the rate of eighty miles an hour—fifty miles straight away, twenty miles up and down, and ten miles sideways.—*New York Evening Post.*

"The New Era of Railroad Management."

The great railroad systems of the country have never made a better average showing of traffic and earnings than they have done of late. But at the same time the prices at which their stocks and bonds are quoted have been exceptionally low, when tested by the income which they yield. One important reason for this is that several of the great railroads have been very large borrowers of money. Others are merely awaiting a favorable chance to come into the market. The faith of the public in the future of these properties appears to be tinged with a certain shade of distrust of their financial management. Were betterments being paid for out of current large earnings at the expense of dividends, railroad stocks would doubtless command more confidence. Were the necessity for maintaining a surplus fund more generally recognized, both bonds and stocks could hardly fail to command higher prices. No manufacturer is thought conservative who does not annually write off about ten per cent. of capitalization for depreciation of plant, and who does not provide a corresponding fund to replace old machinery with new so as to keep pace with the march of improvement and invention; but a prevailing, though by no means universal, vice of railroad finance is that while the capital account keeps growing no substantial part of the earnings is set aside for replacement.

The transfer into the hands of a few great capitalists of the management of the great interstate trunk lines has tended to aggravate rather than to cure this radical defect of management. As in the case of the chief industrial trusts, there has been a constant endeavor to aid stock speculation by satisfying the clamor for dividends. This is not a new fault in railroad finance. Ten years ago the disposition of directors to assume that their retention of their places depended on their success in satisfying the greed for dividends accounted for the helpless position in which a bad year or two placed so many of the great companies. It might have been assumed that when the future of the great railroads passed into the hands of a few presumably conservative bankers all this would be changed. The fact seems to be that practical railroad men who had learned the lesson of the past have acquired sounder views of railroad finance than the great bankers who have displaced them in shaping policy. Indeed, some resignations of important positions might be cited which have turned on this very difference of opinion.

The community of interest, thought to be essential to secure the maintenance of rates has been purchased at an inordinately high price. . . . .—*Journal of Commerce*, New York.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

The Railway Signaling Club.

On Tuesday, September 8, the date for the regular September meeting of this club, there will be held two meetings, one in Chicago and one in New York. This course has been decided on in response to the quite general desire to have frequent conferences which can be conveniently attended by a large number. At these meetings some of the committee chairmen will make informal reports of progress and ask the views of members on certain questions. The president requests all chairmen to do this if it will help them. The meetings are to be held at the Great Northern Hotel, Chicago, and the Manhattan Hotel, New York, both beginning at 2 o'clock p.m. The Committee on Topics presents for discussion the question

WHAT CONSTITUTES THE COST OF MAINTAINING SIGNALS?

The cost of maintaining signals on different roads is frequently compared by railroad officers, but as each road has its own method of computing such cost, it often happens that certain items are included on one road, while on another the same items are charged to some other account, so that such comparisons are practically worthless. They cannot be made useful except by the adoption of a uniform standard, defining what should be charged to maintenance.

While it may not be within the province of the signal engineer to establish such standards, it will be well for the club to discuss the question, and the following points are suggested. If a discussion is had, each head of a Signal Department can then lay before his superior the conclusions which are reached.

Mechanical or Power Plants.

Should maintenance be charged with anything other than ordinary wear and tear of the plant? If not, to what account should we charge renewal of wooden parts, which have become unsafe from decay? Or parts of the machine or lead out which have become so worn that renewals are necessary?

Again, where a plant is in fair condition and track changes are made, necessitating changes in machine and lead out, and the track changes are done under current repairs, to what account should the machine and lead-out changes be charged?

To what account should we charge oils, waste and other supplies? To what account the salaries of lampmen at interlocking plants and of repairmen at power plants?

Automatic Block Signals.

Assuming that all material used and labor employed in keeping up existing signals should be charged to maintenance, to what account should be charged the bonding of new rail, the renewal of insulated splices and renewals of pole lines? To what shall we charge cost of changes in location of poles, and renewal of poles (wood)? Also expenses due to derailments and floods. Where shall we charge items due to renewals or changes in switches or crossovers and other work of this character for which there is no special order?

What proportion of the salaries of supervisors, repairmen, batterymen and lampmen should be charged to maintenance, and what to conducting transportation?

Should battery material, kerosene oil, waste, matches and other necessary material be charged to maintenance or to conducting transportation?

A member propounds the following: What parts of repairs to manual interlocking should be charged to maintenance and what to conducting transportation?

If other committee reports for this meeting are received by the secretary in season to be published in the railroad journals of September 3-5, he will endeavor to have them so published.

PERSONAL.

—Mr. L. A. Pease, formerly Superintendent of the Dining Car Department of the Chicago, Milwaukee & St. Paul, died at his home in Chicago on August 15.

—Mr. C. W. Cushman, the organizer and for many years the manager of the Railway Car Association at Buffalo, died at his home in that city on August 19, at the age of 55. Mr. Cushman was born in Cleveland, Ohio, and served in the Army of the Cumberland in the Civil War. He was with Sherman in the march to the sea. For 11 years, ending in 1880, Mr. Cushman was General Agent of the Lake Shore & Michigan Southern at Cleveland.

—Mr. Geo. H. Gilman, who has been promoted from Superintendent of Car Shops to the position of Master Car Builder for the entire Northern Pacific System, began his railroad service in 1883, at the age of 21, as car repairer and inspector on the Texas & Pacific. From 1884 to 1893, he held the positions of car repairer, inspector and foreman on the Northern Pacific, and in 1893 was appointed General Car Foreman at South Tacoma, Wash. Mr. Gilman will have his office at St. Paul.

—Mr. D. W. Bigoney, recently appointed Treasurer of the Erie, began his railroad service with the Atlantic & Great Western (the Ohio division of the Erie) in 1872. He held various positions in the Auditing Department, and in 1896 was appointed Auditor of Disbursements of the Erie Lines. On April 1, 1903, he became Assistant Auditor, and on July 15 was appointed Assistant General Auditor, from which position he has now been appointed Treasurer of the Erie.

—Mr. William P. Robinson, Jr., formerly General Manager of the St. Joseph & Grand Island, died in Kansas City on Aug. 19 at the age of 43. He entered railroad service in 1878. In 1888 he became General Freight Agent of the St. Joseph & Grand Island, and was appointed General Manager in 1890. In 1892 he became Assistant to the General Manager of the Erie Despatch, but a year later returned to the St. Joseph & Grand Island as General Manager, where he remained until May, 1900, when he resigned. He has lately been engaged in railroad contracting business in Kansas City.

—Mr. G. J. Hartman, who has been appointed Assistant General Superintendent of the El Paso & Southwestern, was born at Greenwood, Pa., in 1854. He entered railroad service in 1873, in the employ of the Atchison, Topeka & Santa Fe, and since that time he has held successively the positions of telegraph operator, agent, Assistant Roadmaster, Trainmaster and Superintendent of the same road. In 1897 he became Superintendent of the Chihuahua Division of the Mexican Central at Chihuahua, Mexico, and later accepted the same position with the Texas & New Orleans. Mr. Hartman will be the Assistant to Mr. H. J. Simmons, General Superintendent, and will have his headquarters at El Paso, Texas.

—Mr. J. Elfreth Watkins, of Washington, D. C., and the Smithsonian Institution, died suddenly on August 11, at the age of 51. The death of Mr. Watkins removes a prominent figure from scientific circles. He was graduated from Lafayette College in 1871, and in the same year became Assistant Engineer of Construction on the Pennsylvania Railroad. In 1873 he was disabled from further field work by an unfortunate accident that necessitated the amputation of his right leg. After his recovery, he became chief clerk of the Amboy Division of the Pennsylvania, but in 1884 went to the Smithsonian Institution as curator of technology. The knowledge which he had of the early history of the Pennsylvania Railroad led him to re-enlist in the service of that company at the time of the Columbian Exposition in 1893, and to prepare a complete history of the first 50 years of the railroad. Among his other well known writings are the "Development of American Rail and Track," the "Transportation and Lifting of Heavy Bodies by Ancients," and the "Beginnings of Engineering." He was an associate of the American Society of Civil Engineers.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—Alfred Lovell, Assistant Superintendent of Motive Power, has been appointed Superintendent of Motive Power, in place of G. R. Henderson, resigned. The headquarters of Mr. Lovell will be at Topeka, Kan.

Cleveland, Cincinnati, Chicago & St. Louis.—C. S. Millard, Assistant Engineer of the Illinois Central, in charge of the double track construction work between Memphis, Tenn., and Fulton, Ky., has resigned, and is to be Engineer of Maintenance of Way on the Peoria & Eastern Division of the Cleveland, Cincinnati, Chicago & St. Louis. E. I. Rogers will succeed Mr. Millard in supervising the double track work.

Detroit Southern.—George M. Henry has resigned his position as General Passenger Agent, and is to become Vice-President of the Whipple Coal Company.

Duluth, Virginia & Rainy Lake.—G. F. Bristol, Assistant Engineer of the Pere Marquette, has resigned to accept the position of General Manager of the Duluth, Virginia & Rainy Lake, succeeding R. A. Eva, resigned. Mr. Bristol will have his headquarters at Virginia, Minn.

El Paso & Southwestern.—G. J. Hartman has been appointed Assistant General Superintendent, with headquarters at El Paso, Texas.

Erie.—E. I. Bowen, Division Engineer at Allegheny, has been appointed Trainmaster of the Allegheny Division in place of F. R. Mosher, transferred. Mr. Bowen will be succeeded by F. W. Allen.

Great Northern.—Alexander Stewart, Resident Engineer at Spokane, Wash., has been promoted to be Consulting Engineer, with headquarters at Seattle, Wash. Mr. Stewart will be succeeded by O. S. Bowen, his present assistant.
See Spokane Falls & Northern.

Gulf, Colorado & Santa Fe.—Frank G. Pettibone, Assistant to General Manager W. C. Nixon, has been appointed General Superintendent, with headquarters at Galveston, Texas.

Hearne & Brazos Valley.—A. F. Moursund, Roadmaster for the Louisiana & Western (Southern Pacific) at Algiers, La., has been appointed Superintendent of the Hearne & Brazos Valley.

Illinois Central.—See Cleveland, Cincinnati, Chicago & St. Louis.

Lake Shore & Michigan Southern.—See New York Central.

Maricopa & Phoenix & Salt River Valley.—D. G. Locke has been appointed Roadmaster at Phœnix, Ariz., succeeding W. F. Stelzriede, resigned.

New York Central & Hudson River.—The headquarters of H. S. Rogers, Superintendent of Track, have been changed from Canajoharie, N. Y., to Frankfort, N. Y.
L. H. Van Allen, who recently resigned as Superintendent of the Buffalo Division of the Lehigh Valley, has been appointed Special Agent of the New York Central & Hudson River, reporting to General Superintendent J. P. Bradfield.
J. R. Smart, Superintendent of Dining Car Service on the Lake Shore & Michigan Southern, has been appointed to a similar position on the New York Central, succeeding J. T. McKee, who has resigned to enter business.

Pennsylvania.—C. K. Shelby, Assistant Master Mechanic at Renovo, Pa., has been appointed Assistant Engineer of Motive Power of the Philadelphia & Erie Division, with headquarters at Williamsport, Pa.
J. H. Stadleman, Assistant Engineer of the New York Division at Jersey City, has been appointed Assistant to the Engineer of Maintenance of Way, with headquarters at Philadelphia. Mr. Stadleman will be succeeded by G. P. Miller, Assistant Engineer at Buffalo, N. Y. C. S. Krick, Assistant Engineer of the Pennsylvania and the Northern Central at Williamsport, Pa., has been appointed Assistant Engineer of Terminals at Philadelphia. This is a new position which has been made necessary by the large amount of extra work that is to be done in and about that city.

Pere Marquette.—See Duluth, Virginia & Rainy Lake.

Pittsburg, Shawmut & Northern.—H. S. Hastings, who has been Auditor and Assistant Treasurer for the past four years, has been promoted to Auditor and Comptroller. H. G. Meyers has been appointed Assistant Auditor, with office at St. Marys, Pa.

St. Louis & San Francisco.—Robert Rennie, heretofore Mechanical Engineer, has been appointed Shop Superintendent, with headquarters at Springfield, Mo.

Southern.—W. E. West has been appointed Resident Engineer of the Charlotte Division at Charlotte, N. C., in place of H. L. Coe, resigned. S. C. Ramsey has been appointed Roadmaster of the Asheville Division in place of R. E. Simpson, promoted.

Southern Pacific.—B. A. Worthington, Superintendent of the Coast Division at San Francisco, has been promoted to be Assistant to Vice-President Kruttschnitt. J. C. Wilder, Assistant Superintendent of the Western Division at Oakland Pier, Cal., will succeed Mr. Worthington at San Francisco.
See Hearne & Brazos Valley.

Spokane Falls & Northern.—H. L. Sheppard, formerly Assistant Roadmaster of the Kalispell Division of the Great Northern, has been appointed General Roadmaster of the Spokane Falls & Northern, with headquarters at Spokane, Wash.

Toledo, St. Louis & Western.—M. C. Cleveland has resigned from the Engineering Department of the Cleveland, Cincinnati, Chicago & St. Louis, and has been appointed Assistant Engineer of the Toledo, St. Louis & Western.

Valdez, Copper River & Tanana.—J. Francis Lee is appointed Vice-President and General Manager. To be effective Sept. 3.

Wisconsin Central.—A. H. Langdon, Engineer of the Northern Division at Abbottsford, Wis., has been appointed Engineer of the Southern Division, with headquarters at Fond du Lac, Wis., in place of J. J. Drummond, resigned. Mr. Langdon will be succeeded by R. W. Cattermole.

Yazoo & Mississippi Valley (Illinois Central).—W. F. Crew has been appointed Acting Assistant Engineer, with office at Memphis, Tenn., succeeding W. W. Hayden, resigned. Mr. Crew has been located at Memphis for several months as Resident Engineer in charge of the construction work of the new yards, and also of the Iowa avenue subway.

LOCOMOTIVE BUILDING.

The Coal & Coke Ry. is having two locomotives built at the Baldwin Works.

The Atlantic Coast Line is having seven locomotives built at the Baldwin Works.

The Northern Railway of Argentine is reported to be in the market for four locomotives.

The East Jordan & Southern has ordered one mogul (2-6-0) locomotive from the Baldwin Works.

The Richmond, Fredericksburg & Potomac has ordered 10 Pacific (4-6-2) locomotives from the Baldwin Locomotive Works, for 1904 delivery. The specifications have not yet been decided upon.

CAR BUILDING.

The Chicago & Alton is reported to be in the market for 500 box cars.

The Atchison, Topeka & Santa Fe denies being in the market for 10 express cars.

The Trinity & Brazos Valley is having 50 freights built at the Georgia Car & Mfg. Co.

The Temiskaming & Northern has ordered 100 30-ton flat cars from Rhodes, Curry & Co., Amherst, N. S.

The Pittsburg Coal Co. is having 25 freights built at the Huntington Works of the American Car & Foundry Co.

The Mexican Central has ordered four first class and six third class coaches and five baggage cars from the Pullman Company.

The Bismarck, Washburn & Great Falls has ordered 20 80,000 lb. freight cars from the Pullman Co. Vanderbilt brake-beams will be specified.

The Chicago Great Western is figuring on between 30 and 40 passenger cars, to be delivered this fall and next spring. The specifications have not been fully decided upon.

The Coal & Coke Ry. has ordered ten 38-ft. ballast cars of 80,000 lbs. capacity from the Rodger Ballast Car Co., for September delivery. The special equipment includes: Westinghouse air-brakes, Tower couplers and Miner draft rigging.

The Erie has ordered 100 ballast cars of 80,000 lbs. capacity from the Rodger Ballast Car Company. These cars will weigh 35,600 lbs., and will be 32 ft. 10 in. long, 8 ft. 4 in. wide and 4 ft. high, all inside measurements.

The Pittsburg & Lake Erie, as reported in our issue of July 3, has ordered 10 passenger coaches from the American Car & Foundry Co. These coaches will be equipped with Westinghouse high-speed brakes, Buhoup couplers, Pintsch gas and Paige wheels.

The Mobile, Jackson & Kansas City has ordered 200 flat cars of 80,000 lbs. capacity and 50 box cars of 60,000 lbs. capacity from the American Car & Foundry Co., for immediate delivery. The flat cars will be 40 ft. long and the box cars will be of A. R. A. standard. The special equipment for both includes: Carnegie Steel Co.'s axles, American Steel Foundries bolsters, Buffalo Brake-Beam Co.'s brake-beams, Lappin brake-shoes, Westinghouse air-brakes, Tower couplers, Miner tandem draft rigging, Harrison dust guards, National journal boxes, Sherwin-Williams paint, Pittsburg Spring & Steel Co.'s springs, and American Car & Foundry Co.'s wheels.

BRIDGE BUILDING.

ATLANTA, GA.—The County Commissioners will build a bridge over the Chattahoochee River at Pace's ferry, between Cobb and Fulton counties, at a cost of about $10,000.

BUTTE, MONT.—The Northern Pacific, it is stated, has given a contract to Captain Walter J. Bradshaw for replacing many of the trestles and bridges on the Butte-Logan line.

CLAY CENTER, KAN.—The County Commissioners have decided to rebuild the Clifton and Vining bridges over the Republican River.

COLUMBUS, OHIO.—The Casparis Stone Company has submitted plans to the County Commissioners for a bridge 140 ft. long, to be built by the company over the Scioto River, at its quarries in the Marble Cliff.

COVINGTON, KY.—The Louisville & Nashville and the town directors of Central Covington are considering plans for the building of a viaduct from Madison avenue to Russell street, at State street, Central Covington.

DAYTON, OHIO.—The City Council is considering an ordinance for the issue of $220,000 worth of bonds to build a steel concrete bridge over the Miami River at Third street.
Bids may soon be asked for a bridge over the Miami River at Hermon avenue, to cost about $24,000.

DONORA, PA.—The construction of a bridge between this place and Webster, authorized by Congress last February, has been under consideration by Washington and Westmoreland County Supervisors. The bridge is to be 1,000 ft. long over the Monongahela River, and to cost about $100,000.

EAST HARTFORD, CONN.—A bridge may be built over Hockanum River at Forbes street, to cost about $11,000.

EAST LIVERPOOL, OHIO.—The East Liverpool bridge, it is stated, will be improved at an expenditure of $25,000, by the Parkersburg Trust Company.

ELKTON, MD.—Bids are wanted Sept. 8, by the County Commissioners, for two steel bridges over Principio Creek, of 53 ft. and 58 ft. respectively.

EUREKA, CAL.—Bids are wanted Sept. 15, by the Board of Supervisors of Humboldt County, for an iron bridge over the Mattole River, near Petrolia.

EVANSVILLE, IND.—Bids are wanted by the County Commissioners, Sept. 17, for the building of a steel bridge over Pigeon Creek at Maryland street, to cost about $37,000.

FAYETTEVILLE, N. C.—The Raleigh & Cape Fear R. R. is not ready to build the railroad bridge over the Cape Fear River near this place.

FORT DODGE, IOWA.—The city officials have under consideration a viaduct over the Minneapolis & St. Louis tracks on North Fifteenth street.

FULLERTON, NEB.—A steel bridge over the Loup River at Genoa, it is reported, will be built by Nance County, to cost about $30,000.

IGUALA, MEXICO.—A bridge to cost $12,000 may soon be built at this place.

IOWA CITY, IOWA.—The viaduct at Lucas street, over the Rock Island track, will be rebuilt by the city. C. S. Magowan, City Engineer.

JANESVILLE, WIS.—Bids opened Aug. 8 for building a street bridge over Rock River were: Wisconsin Bridge & Iron Co., Milwaukee, Wis., $15,895; American Bridge Co., Milwaukee, Wis., $21,580; Elkhart Bridge Co., Elkhart, Ind., $18,350; Clinton Bridge & Iron Works, Clinton, Iowa, $24,000; King Bridge Co., Cleveland, Ohio, $22,877; Milwaukee Bridge Co., $17,700; L. H. Johnson, Minneapolis, Minn., $15,500.

KANSAS CITY, KAN.—Bids are wanted Sept. 14, by the County Commissioners, for a steel bridge over the Kansas River at Kansas avenue. Address F. M. Holcomb, Wyandotte, County Clerk.

LAFAYETTE, IND.—A bridge at Davis ferry, over the Wabash River, also one at Jewettsport, is under consideration by the County Commissioners.

LONDON, ENG.—Bids are wanted Feb. 1, 1904, by the Commercial Intelligence Branch of the Board of Trade, No. 50 Parliament street, S. W., for three bridges over the Nile at Cairo. Bids must be accompanied by a deposit for about $10,000.

MARINETTE, WIS.—The lower bridge has been damaged to the extent of $10,000 by a steamer running against it.

MEMPHIS, TENN.—Bids are wanted Sept. 14, by the County Court, for steel bridge work in the county.

MINNEAPOLIS, MINN.—Plans are being prepared for a four-span steel truss bridge over the Mississippi at Thirty-second avenue north.

MONTREAL, QUE.—The Canadian Parliament has incorporated a new company to build a bridge across the St. Lawrence River between Montreal and Longueuil. Hon. U. H. Dandurand, Hon. R. Forget and James Cochrane are among the principal promoters.

NEW FLORENCE, MO.—Bids are wanted Sept. 8, by T. L. Cardwell, Montgomery County Surveyor, for a steel bridge 138 ft. long, over Whetstone Creek, eight miles west of Montgomery City; also for a 20-ft. span over Coon Creek, five miles northwest of Wellsville.

PENSACOLA, FLA.—The County Commissioners will build a steel bridge about 700 ft. long and 12 ft. wide, with a turnout of 18 ft. in the center, over Bayou Texar.

PITTSBURG, PA.—Plans for the repair of Point bridge, which will cost about $150,000, it is reported, are in the possession of E. N. Bigelow, Director of Public Works, for his action in the matter.

PORT HOPE, ONT.—The Bridge Committee of the Counties' Council has decided to ask for bids for building a steel bridge between Cartwright and Manvers.

SAN FRANCISCO, CAL.—Plans have been prepared for a steel drawbridge to be built at the foot of Third street, over Water Channel, by the Atchison, Topeka & Santa Fe; it is to be a two-leaf Page bascule bridge.

SANTA BARBARA, CAL.—Plans are being arranged to build five bridges over Mission Creek. An appropriation of $20,000 has been made by the city for this work.

SCRANTON, PA.—Bids are wanted Sept. 1, by the Lackawanna County Commissioners, for some concrete bridge work in Benton Township. Address E. A. Jones, County Comptroller.

SEATTLE, WASH.—The Board of Public Works will ask bids for the rebuilding of the Grand street bridge from Plummer to Charles street, at a cost of about $50,000.

SOUTH BEND, IND.—Plans have been prepared, it is stated, for a bridge over Yellow Creek, in Liberty Township, and one over Miller ditch.

SOUTH OMAHA, NEB.—The Council has passed an ordinance providing for the building of a viaduct over the railroad tracks from the western end of O street to the stock yards.

STRASBURG, OHIO.—Bids are wanted Sept. 9, by Tuscarawas County for a steel bridge 130 ft. long over Sugar Creek. Address C. C. Ferissell, New Philadelphia, Ohio.

SYRACUSE, N. Y.—The New York Central is making plans to build a viaduct for the West Shore crossing in Main street.

TORRESDALE, PA.—The County Commissioners have approved the plans for a bridge at this place, and bids will soon be asked.

TRENTON, N. J.—The Pennsylvania may bridge its tracks at Herman avenue.

WATERLOO, IOWA.—The viaduct over the Illinois Central and the Chicago Great Western may be lengthened.

Other Structures.

ASHLAND CITY, TENN.—The Tennessee Central improvements at this place will include a passenger station and a freight house.

BRANDON, MAN.—The Canadian Pacific will build a new station at this place.

CAMDEN, N. J.—The Camden & Suburban Railway Company, it is stated, is receiving bids for a one-story brick and steel car barn. It is to be 100 ft. x 300 ft.

COUNCIL BLUFFS, IOWA.—The Wabash, reports state, will build a station at this place, for which plans have been prepared.

DURHAM, N. C.—The Corporation Commission has accepted the plans of the Southern Railway for the union station at this place. The plans call for a building 185 ft. long, with platforms 10 ft. wide at each end. The work is to begin within 60 days.

ENSLEY, ALA.—According to press reports, the Southern, the Louisville & Nashville and the Illinois Central will shortly build passenger stations at this place.

GLENWOOD, PA.—The Baltimore & Ohio, it is stated, has awarded a contract to Geo. B. Swift & Co., to build new repair, machine, foundry and car construction shops at this place.

HAMMOND, IND.—The Simplex Railway Appliance Company, it is stated, will enlarge its shops by a two-story building, 200 ft. x 300 ft., to cost about $50,000.

JOLIET, ILL.—The American Steel & Wire Company is to build an addition to its plant, the building to be 127 ft. x 208 ft. Bids are now being asked.

KNOXVILLE, TENN.—The Knoxville, La Follette & Jellico will build a station, for which bids are asked by R. Montfort, Chief Engineer of the Louisville & Nashville at Louisville.

MCGREGOR, TEXAS.—The St. Louis Southwestern may soon build a station at this place.

MARCHAND, PA.—The Pittsburg & Lake Erie will build a brick passenger and freight station at this place, to cost about $20,000. The company is also building a locomotive roundhouse.

MARION, IND.—Plans have been prepared, reports state, for a three-story station, 132 ft. x 134 ft., to be built on Fourth street by the Marion & Kokomo Traction Company.

MEXICO CITY, MEXICO.—The Ferro Carrilles Unidos de Yucatan, reports state, will build a passenger station to cost about $250,000.

MUSCATINE, IOWA.—Plans are being prepared, it is stated, by the Chicago, Rock Island & Pacific for a new station at this place.

NASHVILLE, MICH.—The Michigan Central, it is reported, will build a station of grey pressed brick, 34 ft. x 65 ft., at this place.

NEW KENSINGTON, PA.—Plans have been prepared by the Pennsylvania, it is stated, for a new station at this place, to cost about $15,000.

NEW ORLEANS, LA.—Bids are wanted Sept. 15, by the Board of Commissioners, for the building of steel sheds at Celeste street.

PITTSBURG, PA.—The West Side Belt Line is asking bids for a roundhouse and a shop, to be built near Castle Shannon.

RONCEVERTE, W. VA.—The Chesapeake & Ohio will build machine shops and a roundhouse at this place.

TACOMA, WASH.—The Tacoma Railway & Power Company has plans ready, it is stated, for a car barn to be built here at a cost of about $35,000. It is to be a brick structure.

TOLEDO, OHIO.—The Toledo, St. Louis & Western has plans ready for a freight station to be built at Krause and Hunt streets.

TORRENCE, N. MEX.—Plans are being made for a union station to be built at this place by the Rock Island and the Santa Fe Central.

UXBRIDGE, ONT.—The Grand Trunk will build a new station at this place.

WINNIPEG, MAN.—The Canadian Pacific, it is stated, will build shops in Winnipeg to cost about $1,000,000.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BALTIMORE & OHIO.—Bids for the new union passenger station at Washington, D. C., will be opened on Sept. 9.

BELINGTON & BEAVER CREEK.—Contract has been awarded to Drayton & Co., Belington, W. Va., for building a cut-off 1½ miles long to reach Dartmoor.

BELLINGHAM BAY & BRITISH COLUMBIA.—Amended articles of incorporation have been filed by this company, providing for an extension from Whatcom, Wash., to Spokane, via Hannegan Pass, and also for a branch line from Hampton to Blaine, via Lynden. The contract for grading the first five miles from Hampton to Lynden is reported let to A. C. Goerig, Everett, Wash. (July 17, p. 534.)

BERLIN, WATERLOO, WELLESLEY & GEORGIAN BAY (ELECTRIC).—The Dominion Parliament has incorporated this company, with power to build from Berlin, Ont., north to Collingwood, 80 miles. J. G. Reiner, Berlin, Ont., is said to be interested.

BURLINGTON INTERURBAN.—This company has been organized in Iowa, with a capital stock of $200,000, for the purpose of building an interurban electric line from Burlington, Iowa, west through Des Moines, Lee and Van Buren Counties to Keosauqua, 45 miles. The officials of the company announce that surveys will be made at once, and contracts for grading will be let as soon as the surveys are completed.

CANADIAN YUKON WESTERN.—Incorporation has been granted this company by the Dominion Parliament to build from Dawson City west to the Alaskan boundary. J. H. Lamont, Prince Albert, Saskatchewan, is one of the incorporators.

DEEPWATER R. R.—An officer writes that this line has been located from Deepwater, Fayette County, W. Va., to the Bluestone River, Mercer County, 90 miles. Five miles have been finished and 51 miles are now being graded. Contracts for building the remaining 34 miles will be let as soon as the rights of way have been secured. W. N. Page, Ansted, W. Va., is Chief Engineer. (May 13, p. 204.)

DENVER, ENID & GULF.—This company, which has recently completed its line from Guthrie, Okla. T., to Enid, 57 miles, is reported about to build an extension from Guthrie north to Hays, Kan., 170 miles. E. L. Peckham, Enid, Okla. T., is General Manager. (June 12, p. 416.)

DENVER, NORTHWESTERN & PACIFIC.—New surveys are reported in progress by this road to avoid the Gore canyon. The original locating surveys were through the canyon, but it is probable that a new survey north of the canyon will be chosen in order to get easier grades.

DES MOINES, IOWA FALLS & NORTHERN.—This company has opened its line from Iowa Falls via Cambridge to Des Moines. (July 31, p. 562.)

ERIE, CAMBRIDGE, UNION & CORRY.—This company has been organized in Pennsylvania, to build an electric railroad from Erie via Union City, to Corry and Cambridge Springs, 45 miles. The contract for building this line has been let to the Pinkerton Construction Company of Philadelphia. It is reported that work will be begun early in September.

GUELPH & GEORGIAN BAY (ELECTRIC).—Incorporation has been granted this company by the Dominion Parliament, with power to build a railroad from Guelph, Ont., to Owen Sound, and other points on Georgian Bay. Colonel N. Higginbotham, Guelph, Ont., is said to be interested.

HOLLINS, HEFLIN & SYLACAUGA.—Press reports state that this company will build an extension from its present western terminus west to Moriah, Ala., about 12 miles. Contracts for grading will shortly be let. J. A. Edwards, Hollins, Ala., is the engineer in charge of the work. John L. Kane is President.

ILLINOIS ROADS.—Articles of incorporation of the Knox Construction Company have been filed in Illinois. It is reported that the company will build a railroad from Etherley, Ill., south to Dahinda, five miles, through coal lands. Connection will be made with the Atchison, Topeka & Santa Fe at Dahinda. H. M. Chase and A. R. Cline, Etherley, Ill., are said to be interested.

INDIANAPOLIS SOUTHERN.—Bids for building this line from Indianapolis, via Bloomington, to Sullivan, about 140 miles, have been received at the office of the company, and contracts will be let within the next two weeks. Surveys have been finished and rights of way secured. D. M. Parry is President, and T. H. Hazelrigg, Indianapolis, Ind., Chief Engineer. (June 26, p. 417.)

KANSAS CITY, MEXICO & ORIENT.—It is stated that this company will build from Sherwood, Texas, to Spofford, instead of building from San Angelo to Spofford. Surveys have been made over both routes, but the latter has been found to be considerably shorter, and has easier grades.

LOUISIANA, TEXAS & NORTHWESTERN.—Articles of incorporation have been filed by this company in Louisiana to build a line from Shreveport, La., to South McAlester, Ind. T., 250 miles. J. A. Hill, South McAlester, is President, and J. J. Bell, Des Moines, Iowa, Secretary. It is stated that the line will eventually be extended to the Gulf of Mexico.

MANNINGTON & FAIRMONT (ELECTRIC).—This company has been incorporated in West Virginia, to build an electric railroad from Mannington east to Fairmont, 12 miles. The new line will parallel the Baltimore & Ohio between these points. F. W. Bartlett, C. R. Snodgrass, J. O. Henry, F. A. Prichard and others of Mannington, W. Va., are incorporators.

MARION & NORTHEASTERN (ELECTRIC).—This company has been reorganized and proposes to build an electric line east from Marion, Ia., to Springfield, and thence north through Whittier, Waubeek and Prairiesburg to Manchester, 36 miles. The names of those interested are not stated.

MARYVILLE & ST. JOSEPH (ELECTRIC).—A charter has been granted this company in Missouri. It is proposed to build an electric railroad from Parnell, in Nodaway County, Mo., to St. Joseph, 70 miles. R. M. Bradbury, C. E. Bartlett, Adolph Lippman, C. E. Gonnell and J. W. Thompson, all of Maryville, are incorporators.

MEXICAN CENTRAL.—A branch line will shortly be built by this company from a point on the main line near Fresnillo, in the State of Zacatecas, west to Sombrerete, 70 miles. Governor Garcia, Zacatecas, is said to be interested.

MEXICAN ROADS.—The newspapers say that a railroad will shortly be built from Las Charcos, in the State of San Luis Potosi, Mexico, southeast to the Tiro mines. T. G. Creerling is Vice-President and General Manager of the mining company which will build the road.

The Mexican Government has granted a concession to an English company for building and operating a railroad from Hermosillo, in the State of Sonora, Mexico, south to the port of Guaymas, 80 miles. The proposed line will not parallel the Sonora branch of the Southern Pacific between these two points, but will run through the interior, passing through a large number of mining camps.

MICHIGAN ROADS.—Press reports state that the Lakewood Lumber Company is about to build a railroad from Cheboygan, Mich., southwest to Pellston, 20 miles. O. J. Smith, Lakewood, Mich., is General Manager of the company.

MIDDLE CREEK & GAULEY.—A charter has been granted this company in West Virginia, and it is proposed to build from the mouth of Middle Creek, Clay County, south to Gauley, Fayette County, 20 miles. H. S. Cato, Samuel Stevenson, W. E. Byrne and R. G. Quarrier, all of Charleston, W. Va., are interested.

MISSOURI PACIFIC.—Press reports state that surveys are now in progress on a railroad from Joplin, Mo., west to Chetopa, Kan., 35 miles.

MOULTRIE & HARTSFIELD.—Press reports state that the Georgia & Northern is about to build an extension from Moultrie west to Hartsfield, 10 miles, under the above title. C. W. Pidcock, Moultrie, Ga., is General Manager.

MOUNTAIN HOME.—Charter has been granted this company in Tennessee, with power to build from Cotter to Mountain Home, 11 miles. A. J. Truman, W. J. Baker and others of Mountain Home are interested.

NIAGARA, QUEENSTON & ST. CATHARINES (ELECTRIC).—The Dominion Parliament has granted a charter to this company to build an electric railroad from St. Catharines to Queenston. G. J. McIntyre, Niagara, Ont., is said to be interested.

NORTHERN TRACTION.—Articles of incorporation have been filed by this company in Indiana. It is proposed to build an electric railroad from South Bend southwest through La Porte to Valparaiso, 45 miles. S. A. Wight, J. L. Devine, W. C. Nelson and others, of La Porte, Ind., are incorporators.

PENNSYLVANIA.—An officer writes that the Black Lick extension from Ebensburg west via Dilltown to Black Lick, 25 miles, is practically completed and that the line will shortly be opened to traffic.

PITTSBURG, CLEVELAND & TOLEDO.—An amendment to the charter of this company has been filed with the Secretary of State of Ohio, providing for the building of a branch line from a point near Girard, in Trumbull County, to connect with the Pittsburg, Cleveland & Fairport, in the same county.

SAN ANTONIO & ARANSAS PASS.—This company has filed an amendment to its charter providing for an extension from Alice, Texas, to Brownsville, 150 miles, and for a reduction of the capital stock from $5,000,000 to $1,000,000. The latter half of this amendment is in compliance with an order recently issued by the Texas Railroad Commission. (July 24, p. 548.)

SANTA FE CENTRAL.—This road has been completed between Santa Fe, N. Mex., and Torrence, 117 miles. Connection is made with the Denver & Rio Grande at Santa Fe, and with the El Paso & Northeastern (Rock Island) at Torrence. W. S. Hopewell is General Manager. (See Construction Supplement.)

SOUTH & WESTERN.—Extensions will shortly be built by this company from Johnson City, Tenn., north to St. Paul, Va., 90 miles, and from Spruce Pine, N. C., to Marion, 40 miles.

SOUTHERN.—This company is about to build an extension from Oliver Springs, Tenn., northwest through Morgan to Pilot Mountain, 25 miles. The new line will shorten the route between Knoxville and Cincinnati and will avoid several heavy grades.

UNION SPRINGS & NORTHERN.—Surveys are reported in progress for the extension of this road from Fort Davis, Ala., to Rockford, Coosa County, 60 miles. The road now runs from Union Springs to Fort Davis, 7½ miles. The company recently authorized an issue of $1,000,000 in bonds to pay for the proposed extension. W. M. Blount, Union Springs, Ala., is President. (April 10, p. 274.)

WASHINGTON ROADS.—The Portland Coal & Coke Company will build a railroad 60 miles in length from Stella, Wash., to its coal properties in the eastern part of Lewis County. The new line runs through a rich farming, timber and mineral region, and the heaviest grades encountered will not exceed 1½ per cent.

WEST VIRGINIA ROADS.—The Roane Lumber Company of Weston, W. Va., is about to build a logging road from Arlington to timber lands in Webster and Nicholas counties. J. C. Roane, Weston, W. Va., is President and General Manager.

WISCONSIN & MICHIGAN.—This company has filed maps showing a proposed extension from a point on its main line, in Dickinson County, Mich., to the O'Brien coal mine.

GENERAL RAILROAD NEWS.

ANN ARBOR.—Gross earnings for this company for the fiscal year ending June 30, 1903, were $2,041,331, an increase of $147,921. Operating expenses were $1,324,052, an increase of $101,429, leaving an increase in net earnings of $46,491. The surplus for 1903 was $266,131, an increase of $76,274.

CHICAGO & ALTON.—The gross earnings for the fiscal year ending June 30, 1903, were $10,071,920, an increase of $845,353 over the last preceding year. Operating expenses were $6,970,195, an increase of $601,276, leaving an increase in net earnings for the year of $244,077.

CINCINNATI INTER-TERMINAL.—This company has been chartered for the purpose of connecting the freight and passenger stations of the various steam railroads entering Cincinnati. This is not a union railroad scheme in which several roads own interests, but an entirely independent company, with a nominal capital of $10,000. The charter requires that on every portion of the road equal facilities shall be given to all railroads.

The Louisville & Nashville and the Chesapeake & Ohio enter the city of Cincinnati over a bridge across the Ohio River, but to get connection with the Cincinnati, Hamilton & Dayton they must switch their cars over the tracks of the Cleveland, Cincinnati, Chicago & St. Louis and the Baltimore & Ohio Southwestern, a distance of 2½ miles. The charge last year against the Louisvile & Nashville for the interchange of freight cars with the C., H. & D. amounted to $45,000. The Chesapeake & Ohio bridge terminals are only 1,226 ft. distant from those of the Cincinnati, Hamilton & Dayton by the route of the proposed Inter-Terminal tracks. The Louisville & Nashville has entered a contract of perpetual lease to use and operate this 1,226 ft. of track, paying therefor an annual rent of $16,000. In addition to the rental, the Louisville & Nashville is obliged to construct the tracks and all depots which it may deem necessary on the lands of the Inter-Terminal Company, and has also guaranteed the dividends on $400,000 first preferred 4 per cent. stock of the Inter-Terminal Company.

DELAWARE VALLEY.—This road will be sold at auction on Sept. 5. It runs from East Stroudsburg, Pa., to Bushkill, 13 miles. Milton Yetter, East Stroudsburg, Pa., is President.

ILLINOIS CENTRAL.—Meetings will be held on Oct. 13 of the shareholders of the following subsidiary companies, to act on propositions to convey their properties and franchises to the Illinois Central; St. Louis, Alton & Terre Haute; Rantoul R. R.; Illinois & Indiana; Christopher & Herrin; St. Louis & Ohio River; Groves & Sandridge and the Mounds & Olive Branch. All these companies are operated by the Illinois Central.

MEXICAN CENTRAL.—H. Clay Pierce, Chairman of the Board of Directors, recently made the following statement with regard to the supposed association between the Mexican Central and the Rock Island Company: "In view of my election to the voting trust and directorate of the Seaboard Air Line, in association with one of my fellow directors of the St. Louis & San Francisco, I think it is proper that I should emphatically and unequivocally deny the reports that have been circulated during the past six months concerning the connection of the Mexican Central with various American railroad combinations. The Mexican Central Railway Company, of which I am Chairman, is as independent of the Rock Island system as it is of the St. Louis & San Francisco, and has not made, and does not expect to make, any exclusive alliance with any single line or combination of roads."

NEW YORK CENTRAL & HUDSON RIVER.—This company has made application to the New York Stock Exchange to list $6,000,000 additional 3½ per cent. bonds of the issue of 1897. This is a part of an authorized issue of $100,000,000 refunding mortgage bonds, of which $70,000,000 are reserved for the refunding of old bonds, and $14,000,000 for premiums.

VELASCO, BRAZOS & NORTHERN.—It is stated that this road has been consolidated with the Rice Belt R. R., and that work is to be begun on the latter company's proposed railroad. The Velasco, Brazos & Northern at present runs between Anchor, Texas, and Velasco, 20 miles. C. H. Alexander, Dallas, Texas, is President. The Rice Belt was organized in Texas in April, 1903, to build from Galveston southwest along the Gulf coast to Brownsville, near the mouth of the Rio Grande.